The University of Chicago

THE DEVELOPMENT OF ABSTRACT LANGUAGE CONCEPTS IN NORMAL AND IN DEAF CHILDREN

A DISSERTATION SUBMITTED TO THE FACULTY OF THE DIVISION OF THE SOCIAL SCIENCES IN CANDIDACY FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF EDUCATION
1942

By
CORD ORVEY WELLS

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CHAPTER I

AN INTRODUCTION TO THE PROBLEM

Objectives of the Study

The present study is an attempt to trace the development of certain abstract language forms in normal children and in deaf children, and to make comparisons of this development during a period of approximately four years of time. Specifically, the study is concerned primarily with the usage of abstract nouns and words of a relational character, conjunctions, prepositions, and relative pronouns.

The use of deaf subjects serves a dual purpose. First, it makes possible a comparison of deaf and hearing children in their abstract language growth. To the writer's knowledge, no such comparison has been made heretofore. Second, the use of deaf subjects should reveal the importance of one avenue of sensory experience, hearing, on the growth of abstract language. Thus the discussion as to whether the deaf and hearing children actually differ in intelligence, and whether this difference is due to a language handicap, may be partially clarified by the results obtained in the present study.

Studies of language development in children from infancy to maturity have been numerous. These have ranged from the study of vocabulary growth to the study of sentence length and sentence structure, and even to the study of the various shades of generality in words themselves. Of the latter type the notable work of Piaget is outstanding.[1]

In so far as language consists of the use of symbols, it is all in one sense a form of abstraction. Yet much language consists of symbols of concrete objects. These symbols are memorized and attached by means of associations to the corresponding object. Thus nouns, and particularly nouns having their origin in direct sensory experience, are among the symbols first found in the

---

[1]Jean Piaget, Child's Conception of Physical Causality. New York: Harcourt, Brace and Co., 1930.

child's vocabulary. Analysis of children's vocabularies has shown that these nouns comprise the majority of the child's words during the early years. This percentage of concrete nouns representing objects or acts has been shown by Hoppes to decrease with age, whereas those nouns having a greater generality of meaning are found to increase with age.[1] Hence it may be observed, as Judd has pointed out, that there are in reality degrees of abstraction in the language process. Stated differently, there are differences in the complexity of the thinking processes which are reflected in the way in which language is used. In the field of nouns alone, the transition from the concrete or sensory to the abstract or non-sensory is one evidence of a higher order of thinking. The present study attempts to make a more detailed analysis of this transition. To do this, the chief objective set up is to trace the development of all types of words, but particularly of those words or groups of words which are abstract and relational in their character. To determine the part played by sensory experience or sensory content in the thinking at different levels of maturity is therefore a chief objective of the study.

General Methods and Assumptions

Since it is the way a specific word is used which determines its relational character, or its part of speech, we are concerned here with language in use rather than with the static quality of words such as would be revealed in an analysis of dictionaries or of vocabularies when the words are considered apart from their context. The basic data of the study consists, therefore, of two parts: (1) written samples of expression made by normal and deaf subjects, and (2) a completion test involving the subject's ability to recognize situations requiring the use of relational words. This second part of the data deals with the relational words only, but serves really two purposes. It indicates the subject's performance in a recognition situation and it serves as a means of checking on the accuracy of the assumption that usage of words is an indication of understanding of those words. The assumption is made in this study that the actual extent to which words of an abstract or relational character are used is an

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[1] William C. Hoppes, "The Development of Written Expression Among Children of Elementary-School Grades," p. 132. Unpublished Doctor's thesis, Department of Education, University of Chicago, 1931.

indication of the child's understanding of such words. There are reasons, however, for doubting the validity of this assumption. In the first place, it is common knowledge that children use some words without having any very accurate notion of their true meaning. In the second place, many words are understood before they are put into actual use. Language understanding precedes language usage. The latter fact becomes a serious problem when one is considering written language where there is often more formality and less freedom than in oral expression. Two methods are employed in the present study to overcome the defects in the above assumption, as far as the relational words are concerned.

First, an analysis was made of the errors in the use of relational words, particularly of conjunctions and prepositions. These errors were determined by the obvious intent of the thought as revealed in the content of the subject matter rather than by any grammatical distinctions of correctness in choice of words. Relational words used incorrectly, then, were not considered as an indication of the child's development in the use of such words, but were considered instead as merely a mistake in such usage. Most frequently found of such words is the coordinating conjunction "and" which is sometimes used, particularly by younger children, without expressing any clear relationship of ideas. If the words were correctly used to express the idea obviously intended by the writer, then they were considered as evidence of an understanding of such words.

The second method used consisted of a completion test of a type similar to the Minkus Completion Test in the Stanford-Binet series. The test consisted of sixty-five statements each involving the use of a relational word or words to complete its meaning. In most cases the appropriate word was either a subordinating conjunction or a relative pronoun. Thus the child was given an opportunity to recognize the setting for relational words with the related ideas already expressed. In this way an insight into his progress in ability to do relational thinking was obtained, even though he may not have arrived as yet at the stage where he would use groups of words in his writing or speaking in such a way as would require the use of relational words.

An important aspect of relational thinking was also measured in the completion test by making a division of the relational words used into seven different types. They were classified according to whether the related ideas expressed: (1) Cause,

(2) Comparison, (3) Concession, (4) Condition, (5) Relationship,[1] (6) Result, or (7) Time. Thus some insight is gained as to which of these develop first, what the characteristics of growth are in each, and how the deaf and the hearing subjects compare in each.

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[1]Cf. page 72, footnote 1.

CHAPTER II

SOURCES, NATURE, AND AMOUNT OF DATA

Subjects from Whom Data Were Secured

Since the study involved a comparison of normal-hearing pupils with hard-of-hearing pupils, it was found necessary to use the data from the state schools for the deaf in three states in order to secure an adequate number of cases. The principal and the superintendent of the following state schools for the deaf cooperated in the securing of the data: Iowa School for the Deaf, Council Bluffs, Iowa; Minnesota School for the Deaf, Faribault, Minnesota; and the Wisconsin School for the Deaf, Delavan, Wisconsin. Each of these schools volunteered its whole-hearted cooperation in the project. For the normal-hearing pupils, sufficient data were obtained from one large public elementary school, the Roosevelt, in Janesville, Wisconsin.

In order to control the factors in language development as far as possible, among the hearing pupils, it was desirable to obtain data from subjects whose home environments were similar in so far as nationality of parents, social and economic status, and general environmental conditions outside the school were concerned. The Roosevelt School in Janesville seemed to satisfy these conditions as nearly as any American public school. The homes represented are those of average and well-to-do English-speaking citizens in one of the better residential sections in a city of some twenty thousand inhabitants.

Table 1, on the following page, shows the sources and distribution of the data assembled for the final study.

Mean Intelligence of Subjects Used

Hearing subjects.--In order to test the intelligence of these pupils apart from language usage as far as possible, the Chicago Non-Verbal Intelligence Test was given to them at the time when the data were being obtained. All tests given the normal subjects were administered by the writer.

TABLE 1

NUMBER OF PUPILS IN GRADES III, IV, V, AND VI FROM WHOM SAMPLES OF WRITTEN EXPRESSION WERE COLLECTED

Writers and Sex	Grade				Total
	III	IV	V	VI	
Janesville					
Boys.....	25	34	33	32	124
Girls.....	28	30	37	29	124
Iowa Deaf					
Boys.....	12	23	14	11	60
Girls.....	5	20	9	13	47
Minnesota Deaf					
Boys.....	7	7	6	9	29
Girls.....	4	5	7	6	22
Wisconsin Deaf					
Boys.....	14	11	12	15	53
Girls.....	9	7	13	17	46
Total.....	104	137	131	133	505

In number, the 248 normal subjects are equally divided as to sex. From Table 2 it may be judged that they are a representative sample of the population as judged by the results on a non-verbal examination. While the average scores for the girls are slightly higher than those for the boys at each grade level, in no case does the difference approach a significant difference. In only one grade, the fifth, is the mean difference even as large as the probable error of that difference.

The mean scores on this test, for each grade, are shown in Table 2.

TABLE 2

MEAN INTELLIGENCE QUOTIENT SHOWN ON THE CHICAGO NON-VERBAL EXAMINATION IN GRADES III, IV, V, AND VI OF THE JANESVILLE PUBLIC SCHOOL

Number and Average	Grade							
	III		IV		V		VI	
	B	G	B	G	B	G	B	G
N.....	25	28	34	30	33	37	32	29
Mean....	105.9	106.25	104.4	105.5	101	104.9	101.9	101.3
P.E.$_m$...	1.64	2.08	1.77	1.8	2.2	1.69	1.98	1.98

The mean differences between the boys and girls in each grade, and for all grades combined, together with the probable error of those differences, are shown in Table 3.

TABLE 3

MEAN DIFFERENCE IN INTELLIGENCE OF BOYS AND GIRLS IN GRADES III, IV, V, AND VI OF THE JANESVILLE PUBLIC SCHOOL

Sex Difference	Grade								All	
	III		IV		V		VI			
	Diff.	$P.E._d$	Diff.	$P.E._d$	Diff.	$P.E._d$	Diff.	$P.E._d$	Diff.	$P.E._d$
M_g-M_b....	.35	2.65	1.1	2.52	3.9	2.77	.6	2.8	1.1	1.37

Deaf subjects.--For the hard-of-hearing subjects, the non-verbal examination was chosen for use also because it was desirable to measure intelligence apart from language usage as far as possible. Since the use of tests with deaf and hard-of-hearing pupils involves a knowledge of the deaf language as well as of lip reading, the tests in the schools for the deaf were administered by the principal in each school or by someone technically trained for that work. Because the numbers involved in some classes were small, the results from all the deaf schools are combined in Table 4.

TABLE 4

MEAN INTELLIGENCE QUOTIENT SHOWN ON THE CHICAGO NON-VERBAL EXAMINATION IN GRADES III, IV, V, AND VI OF THREE STATE SCHOOLS FOR THE DEAF

Number and Average	Grade							
	III		IV		V		VI	
	B	G	B	G	B	G	B	G
N.....	33	18	41	32	32	29	36	36
Mean.....	82	73.1	88.2	82.5	88.8	91.8	88.2	86.8
P.E.mean.....	2.5	3.2	1.9	2.0	2.3	1.9	2.4	2.2

Thus we find the scores for 142 boys and 115 girls show slight advantages for the boys in Grades III, IV, and VI. In the

fifth grade, which showed the greatest superiority for the girls among normal subjects, there is a small difference in favor of the girls. In Table 5 are shown the mean differences between the boys and girls in each grade and for all grades combined.

TABLE 5

MEAN DIFFERENCES BETWEEN BOYS AND GIRLS IN INTELLIGENCE AS SHOWN ON A CHICAGO NON-VERBAL EXAMINATION IN EACH GRADE AND FOR ALL GRADES COMBINED FOR THREE STATE SCHOOLS FOR THE DEAF

Sex Difference	Grade								All Grades	
	III		IV		V		VI			
	Diff.	P.E.	Diff.	P.E.	Diff.	P.E.	Diff.	P.E.	Diff.	P.E.
M_b-M_g....	8.85	4.1	5.7	2.8	-3.0	2.97	1.45	3.25	3.5	1.68

A comparison of the data in Tables 4 and 5 with that of Tables 2 and 3 reveals some striking differences in the two general classes of subjects used in the study. Table 6 summarizes these differences in intelligence for each grade level.

TABLE 6

MEAN DIFFERENCES IN INTELLIGENCE OF NORMAL AND DEAF BOYS AND NORMAL AND DEAF GIRLS IN GRADES III, IV, V, AND VI

Sex and Group	Grade								All Grades	
	III		IV		V		VI			
	Diff.	P.E.	Diff.	P.E.	Diff.	P.E.	Diff.	P.E.	Diff.	P.E.
Boys M_n-M_d....	23.9	2.99	16.2	2.62	12.2	3.17	13.65	3.12	14.3	1.52
Girls M_n-M_d....	33.1	3.86	23.0	2.70	13.1	2.53	14.5	2.95	18.9	1.55

In each grade there is a significant superiority apparent in the normal subjects. This difference decreases from the lower grades to the higher, but is still sufficiently large to be significant in Grade VI.

As to the nature of these differences, the data of the present study are concerned only with one characteristic or phase

of such differences, namely, that having to do with the acquisition and use of the more abstract forms of language. A discussion of such differences constitutes the major portion of the study and shows considerable superiority for the normal subjects.

Whether these differences are a cause or a result of the differences in intelligence is a question considered further in the theoretical discussion in the final chapter.

Finally, whether the differences in intelligence are due to environmental factors or to biological differences is a much disputed issue and one upon which the present study yields little, if any, information. There was rather clear evidence, before the present study was undertaken, that the deaf and the hearing differ in intelligence. Whether such differences are due to environmental or biological factors is of course a point of much importance, but probably one which does not affect greatly the present study. Because such differences are factors in corrective work and in methods employed in teaching, however, it would be to the advantage of education if the differences were due to environmental causes. That such is the case, however, has little support from experimental evidence. There is the well known fact that much deafness occurring after birth is the result of disease which often is also the cause of mental injury. How often and to what extent this is true is problematical, and sheds no light on the cases of deafness present at birth, some 35 per cent of the total number of deaf. One available bit of evidence concerning the latter group is the fact that children who are born deaf have been found to have parents who have low mental ability. Whether this inferiority in parents is in turn due to the fact that the parents of many deaf children are themselves deaf is a point which may be raised also.

An early study by Pintner and Paterson[1] and a similar study by Reamer[2] found the average intelligence of the congenitally deaf to be the same as that of those whose deafness was acquired.

Inasmuch as it would appear to be a strange coincidence that childhood disease, as a possible factor in affecting the mentality of those whose deafness is acquired, and such conditions

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[1] R. Pintner and D. G. Paterson, "Learning Tests with Deaf Children," Psychological Monographs, Vol. XX, No. 4, 1916.

[2] J. C. Reamer, "Mental and Educational Measurements of the Deaf," Psychological Monographs, Vol. XXIX, No. 132, 1921.

as consanguinity and dull parents, which are frequently mentioned as factors affecting the congenitally deaf, could have the same or equal effect, one might conclude that perhaps the environment is after all the determining factor. There is little doubt that the deaf and the hearing do have a different environment in that the deaf do not come in contact with auditory experiences. In the writer's opinion this is the major factor in determining the differences both in achievement and in mentality of the deaf and the hearing. In general this conclusion is corroborated by the fact that when the criterion for determining intelligence is separated as far as possible from language concepts, as in performance tests, the deaf approach more closely to the hearing standards than is the case even when so-called "non-language" tests are used.[1]

Age of Subjects

Three of the major factors in language development are intelligence, school grade or training, and chronological age. The second of these factors becomes particularly important with the hard-of-hearing child since little language development occurs for him without the special training found in the school.

The mean chronological age for all subjects is shown in Table 7.

TABLE 7

MEDIAN CHRONOLOGICAL AGE IN MONTHS OF 248 NORMAL AND 257 DEAF BOYS AND GIRLS FROM WHOM DATA WERE GATHERED

Subjects	Grade							
	III		IV		V		VI	
		Av.		Av.		Av.		Av.
Deaf								
Boys.....	146	147	158	157	170	165	171	170.5
Girls.....	149		156		160		170	
Normal								
Boys.....	113	112.5	122	122	139	136	145	145
Girls.....	112		122		133		145	
Difference..		34.5		35		29		25.5

[1]Keith MacKane, A Comparison of the Intelligence of Deaf and Hearing Children. Teachers College, Columbia University, Contributions to Education, No. 585, 1933.

Characteristics of Deafness

Age of onset.--Of the hard-of-hearing subjects, only those were used who were born deaf or in whom deafness occurred before the age of two years. Two years was set as the maximum age because vocabulary development at this level is in a very incomplete stage of growth. It consists largely of concrete objects or names, and action words. Few connectives, abstract words, or relational words of any kind have been acquired. Sentence formation is in its primitive stage.[1] Thus, before this age, a hearing loss sufficiently great to make the acquisition of language improbable if not impossible through the ordinary channels of imitation and oral instruction, would probably leave the average child deficient in the type of language with which this study is concerned.

Two years appears to be a very conservative maximum limit in the light of the evidence found by Pintner and Paterson which showed that those who acquired deafness after five or six were decidedly superior in language ability, but those who possessed hearing for the first four years of life showed no advantage in language ability.[2]

Table 8 presents the data with reference to the age of onset of deafness.

TABLE 8

NUMBER AND PERCENTAGE OF BOYS AND GIRLS IN THREE STATE SCHOOLS WHO WERE BORN DEAF OR BECAME DEAF AT VARYING AGES BEFORE THE AGE OF TWO

Sex	Age of Onset										Total	
	Born Deaf		0-5 Mo.		6-11 Mo.		12-17 Mo.		18-24 Mo.			
	N	%	N	%	N	%	N	%	N	%	N	%
Boys	34	13.2	9	3.5	46	17.9	19	7.4	26	10.1	134	52.1
Girls	45	17.5	13	5.1	27	10.5	14	5.4	24	9.3	123	47.8
Total	79	30.7	22	8.6	13	28.4	33	12.8	50	19.4	257	99.9

[1] Arnold Gesell, The Mental Growth of the Pre-School Child, p. 220. New York: Macmillan Co., 1925.

[2] Pintner and Paterson, op. cit.; Reamer, op. cit., p. 130.

From Table 8 it is apparent that 31 per cent of the subjects used in the study were born deaf or hard of hearing, while an additional 37 per cent became deaf[1] before the age of one year. Thus 68 per cent of the total number were probably sufficiently handicapped before the age of one to make the acquisition of language through the auditory sense impossible except through the use of special methods such as a school for the deaf might provide.

Extent of deafness.--For the present study it was important to know the approximate extent of deafness. Authorities on the teaching of the deaf disagree on the extent of hearing loss which must be present in order to make the acquisition of language by the usual oral methods impossible.[2] Both age of onset and the individual's intelligence are determining factors. Intensity of the teaching is likewise a factor.

A single criterion which might be used in studies of this type is the extent of deafness sufficient to cause a child to be placed in a school for the deaf. This was thought to be inaccurate in that other factors in addition to hearing loss combine to cause children to be placed in such schools. Therefore, in the present study two limitations were placed on this criterion. In the first place, only those children were included whose hearing loss occurred before the age of two years. When these were eliminated it was discovered that there were approximately only 15 per cent of the remaining subjects who possessed as much as 40 per cent of hearing. This per cent (40 to 50) was decided upon after conferences with teachers of the deaf as a conservative limit below which a child, if his hearing loss were suffered before the age of two, would not acquire language by the usual oral methods. Consequently these 15 per cent were not used in the study. In

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[1]Note. For the sake of brevity, in Table 8 and throughout the discussion, the term "deaf" is used as a relative term. "Hard of hearing" would be more accurate, since surveys have shown that fewer than three per cent of white children in schools for the deaf are totally deaf (H. E. Day, I. S. Fusfeld, and R. Pintner, A Survey of American Schools for the Deaf, 1924-25, chap. xii, pp. 226 ff. Washington, D.C.: National Research Council, 1928).

[2]Personal correspondence and conferences with the following: V. A. Becker, Principal, Wisconsin School for Deaf, Delavan, Wisconsin; T. E. Bray, Superintendent, Wisconsin School for Deaf, Delavan, Wisconsin; Irving S. Fusfeld, Editor, American Annals of the Deaf, Washington, D.C.; Dora V. Lowe, Principal, Wisconsin School for Deaf, Delavan, Wisconsin; and John G. Nace, Principal, Iowa School for the Deaf, Council Bluffs, Iowa.

Table 9, the 11 pupils (4.3 per cent) whose percentage of hearing is between 40 and 50 were included only after a study of their case indicated that their language development had been of a type similar to that found in pupils with a smaller percentage of hearing.

Because of the obvious difficulty of obtaining accurate records of the deaf child before his entrance into the school, it follows that the data of Table 9 may be inaccurate in some respects. The per cent of hearing indicated is in most cases the amount which was found to be present when the child entered the school. Case histories and parents' and physicians' testimony had to be relied upon to determine the date of onset. On the basis of the data in Table 9, more than 70 per cent of the subjects used have less than 30 per cent of their hearing, and this loss came about before the age of two years. No subject was used whose average hearing for both ears or whose hearing in either ear exceeds 50 per cent and only 4 per cent of the total group have in excess of 40 per cent of hearing.

The per cent of hearing loss as measured by audiometer readings, and the approximate age at which such loss was detected are shown in Table 9.

TABLE 9

PERCENTAGE OF HEARING PRESENT IN 257 PUPILS IN GRADES III, IV, V, AND VI OF THREE STATE SCHOOLS FOR THE DEAF

Percentage of Hearing	Age of Onset of Deafness					Total	Per Cent
	Birth	0-5 Mo.	6-11 Mo.	12-17 Mo.	18-24 Mo.		
0.....	14	...	...	...	...	14	5.5
1-10.....	13	1	9	6	7	36	14.0
11-20.....	5	8	18	11	17	59	22.9
21-30.....	16	10	27	8	16	77	30.0
31-40.....	31	2	15	6	6	60	23.3
41-50.....	...	1	4	2	4	11	4.3
Total.....	79	22	73	33	50	257	100.0

Nature of Data

Written compositions.--As stated in chapter 1, the data for the present study consisted of two general types: written compositions and a completion test. Each subject was asked to write on the four following topics: (1) My Most Exciting Experience, (2) Why I Like Summer Better Than Winter, (3) How To Play My Favorite Game, and (4) This Old Penny. These topics, which are not original, were chosen for specific reasons. All of them make a fairly good appeal to the subject's interests and thus encourage freedom of expression. Since it was desirable to get a comprehensive sampling of each subject's language possibilities, the quantity of writing was important. Topic number one proved best from this standpoint, and especially so with the hard-of-hearing pupils.

Topic number two was chosen in order to give opportunity for reasoning and development of causal relationship and comparisons. Subjects were encouraged to defend the side of the question preferable to them. Topic number three was chosen in order to encourage use of expository materials and perhaps the use of more technical terms than in either of the other topics. Inasmuch as children's play experiences are very similar within the same communities, these papers gave good evidence of differences in vocabulary. Topic number four was used for two reasons. First, a plain description of a concrete object would seem to involve the use of sensory terms very largely. All subjects were confined, theoretically, to a discussion of the same sensory facts. Each of the subjects was given a penny to keep and it was this penny which was described. So this was the only topic upon which the subject did not need to depend principally upon memory for his ideas. Secondly, as an incidental part of the study this topic was taken as an opportunity to discover the characteristics of pupils at different levels of maturity with reference to the extent to which imagination is used wholly or in part to supplement the objective materials actually present to the senses. This topic was considered an especially good source of evidence also for making comparisons of the normal and hard-of-hearing subjects with reference to qualities of imagination.

Because the individual teachers probably know best how to motivate their own pupils, it was thought best to let the individual teachers secure the written materials.

General directions as well as the specific instructions which were used for each theme, are given in the Appendix. The teachers involved were consulted as a group, with the supervisors and principals, and the instructions were made clear. Pupils were given no warning so that preparation and coaching, which might have an effect on the content, were not possible. Teachers understood thoroughly that their results were to be used in no way as a reflection on their teaching; that quantity of expression was the desired objective in this case. To that end they were asked to encourage their pupils to write freely. Each was urged to use his own method of motivation and to ask for the work as if it were a part of the regular routine. In this way it was felt that the teacher, knowing best how to motivate her particular group, could obtain a better sample of work than could anyone else working under more artificial circumstances. With the deaf subjects, of course, only one skilled in the teaching of the deaf could secure the desired results. With both the normal and deaf subjects there was complete cooperation among the teachers, principals, and supervisors in all the schools concerned. All work was carefully done according to instructions, and the results reflected the intelligent efforts of the teachers concerned to obtain well written samples, representative of the subject's own best efforts.

Completion data.--The data for the second part of the study consists of the results of a completion test involving the use of relational words to complete the meaning of sentences with two or more ideas. Each test was composed of 65 statements involving a total of 32 different relational words, most of which are relative pronouns and subordinating conjunctions.

A more complete description of this data is given in chapter iii.

Amount of Data

Normal subjects.--Table 1 shows the total number of pupils from whom data were collected. As will be shown in chapter iii, the composition data for the normal pupils were found to yield reliable results when limited to twenty boys and twenty girls in each grade.

However, in order to make certain that complete data were available for each of the four topics, it was thought desirable to make some substitutions in the original forty subjects from each

grade so that it was necessary to analyze data from 200 pupils for the entire study.

Table 10 shows the total number of words analyzed for the 200 hearing subjects.

TABLE 10

NUMBER OF WORDS ANALYZED FOR BOYS AND GIRLS IN GRADES III, IV, V, AND VI OF THE ROOSEVELT PUBLIC SCHOOL

Group	This Penny	How To Play	Exciting Experience	Why I Like	Total
Grade III					
Boys.....	1,875	2,706	2,692	2,266	9,539
Girls....	2,001	2,458	2,843	2,573	9,875
Grade IV					
Boys.....	1,585	2,713	3,306	1,866	9,470
Girls....	1,689	2,663	3,691	2,098	10,141
Grade V					
Boys.....	2,966	3,165	3,631	2,367	12,129
Girls....	3,117	3,163	3,345	2,824	12,449
Grade VI					
Boys.....	3,741	4,687	4,971	3,227	16,626
Girls....	4,448	4,496	5,632	4,002	18,578
Total..	21,422	26,051	30,411	21,223	98,807

From Table 10 it is apparent that a generous sampling of writing was secured at each grade level. Quantity of expression is a desirable feature in the present study in that a large volume of words affords opportunity for a more reliable analysis of the particular forms of words with which the study is concerned.

With the completion data, tests were administered and analyzed for each of the 248 subjects shown in Table 1.

Deaf subjects.--With hard-of-hearing pupils, a wide range of differences is found in the quantity of writing done at each grade level. Preliminary study showed that there is also a wider range in the quality of the writing at each grade level than is found among the hearing pupils. As a whole, the hard-of-hearing pupils do not write as voluminously as the hearing pupils, especially at the lower grade levels. For these reasons, it was thought desirable to use all of the hard-of-hearing subjects who satisfied the requirements as to age of onset and extent of deafness. Table 1 shows the total number of such subjects to be 257.

The amount of written material which was analyzed for each grade in each of three schools is shown in Table 11.

TABLE 11

NUMBER OF WORDS ANALYZED FOR 257 BOYS AND GIRLS IN GRADES III, IV, V, AND VI OF THREE STATE SCHOOLS FOR THE DEAF

School and Group	Grade				Total
	III	IV	V	VI	
Iowa					
Boys.....	2,567	3,048	3,817	2,156	11,588
Girls....	661	3,525	1,867	4,948	11,001
Minnesota					
Boys.....	2,068	1,554	1,838	2,574	8,034
Girls....	1,464	1,766	2,944	2,710	8,884
Delavan					
Boys.....	2,584	2,023	4,356	7,480	16,443
Girls....	2,458	2,167	5,215	9,188	19,023
Total..	11,802	14,083	20,037	29,056	74,978

Since Table 11 includes data from 257 subjects, whereas Table 10 contains data from 200, a reliable comparison of the amount of writing contributed by each individual cannot be made from the two tables. To compare the two groups in terms of the average number of words written by each subject and the percentage which the deaf is of the normal for each grade, Table 12 is presented.

TABLE 12

AVERAGE NUMBER OF WORDS WRITTEN BY NORMAL AND HARD-OF-HEARING BOYS AND GIRLS AND THE PERCENTAGE WHICH THE HARD-OF-HEARING AVERAGE IS OF THE NORMAL AVERAGE

Group	Grade								Total	
	III		IV		V		VI			
	B	G	B	G	B	G	B	G	B	G
Normal.....	382	395	379	406	485	498	665	743	478	513
Deaf.....	219	254	161	233	313	346	339	468	258	325
Difference..	163	153	218	173	172	152	326	275	220	188
Per cent....	57.3	62.4	42.5	57.4	64.5	69.5	51.0	63.0	54.0	63.4

Three facts are apparent from Table 12. First, average quantity of writing from the hard-of-hearing pupils is in but one grade as great as two-thirds of that for the normal pupils, the total for all grades being fifty-four for the boys and sixty-three for the girls. Second, average quantity of writing for girls exceeds that of boys in every grade among both the hard-of-hearing and the normal; and third, there is a gradual increase in quantity from one grade to the next, with the single exception of the fourth grade for the hard-of-hearing which shows a slight decrease from Grade III. The largest increase in quantity is from Grade V to VI with the normal pupils, and from Grade IV to V with the hard-of-hearing.

CHAPTER III

METHOD AND PRELIMINARY STUDY

The Composition Data

Inasmuch as a detailed and time-consuming analysis of the written materials was a basic necessity in the investigation, the first step consisted of a preliminary study designed to determine as nearly as possible the number of subjects needed in order to get reliable results. This preliminary investigation served also to perfect the technique of analysis to be used in the study proper. This proved to be invaluable later when it was found that no significant changes were necessary after the analysis of materials was begun. A comparison of some of the general results in the preliminary with the main study gives a rough measure of the reliability of the method used in making the analysis. The second means used to determine reliability was to secure the judgment of qualified persons on a sampling of data. Results of these two preliminary steps will be presented in order.

Reliability of word count.--Data were secured from the pupils in the public schools of Northbrook, Illinois, and from the training school of the State Teachers College at Whitewater, Wisconsin. A count was then made of relational words (prepositions, conjunctions, and relative pronouns), abstract nouns, personal pronouns, concrete nouns, and verbs. These counts were made for each grade included in the study. Approximately an equal number of boys' and girls' papers were used, and an equal number of each of the four different themes were used, as nearly as was possible. The percentages of each type of word were computed after the addition of each successive 300 words to the total.

Results of this preliminary count are shown in Tables 13, 14, 15, and 16. An analysis of these tables shows that the percentages of various types of words remain almost constant after about 900 to 1200 words have been included. From that point up to 2100 words there is not sufficient fluctuation to indicate that one would be justified in including more words. In most grades

TABLE 13

PERCENTAGES OF CERTAIN SIGNIFICANT WORDS APPEARING IN WRITTEN SAMPLES OF THIRD-GRADE PUPILS AT SUCCESSIVE COUNTS OF GROUPS OF 300 WORDS

Part of Speech	Words Counted						
	300	600	900	1200	1500	1800	2100
Abstract nouns.....	6.2	10.1	9.4	9.3	9.5	9.8	9.6
Relational words.....	14.1	15.0	16.4	16.2	16.5	16.3	16.2
Verbs.....	17.8	18.4	17.5	18.1	18.0	18.0	18.2
Personal pronouns.....	11.6	10.9	14.1	13.4	13.2	13.4	13.2
Concrete nouns.....	21.2	18.0	14.0	12.1	12.0	12.2	12.2

TABLE 14

PERCENTAGES OF CERTAIN SIGNIFICANT WORDS APPEARING IN WRITTEN SAMPLES OF FOURTH-GRADE PUPILS AT SUCCESSIVE COUNTS OF GROUPS OF 300 WORDS

Part of Speech	Words Counted						
	300	600	900	1200	1500	1800	2100
Abstract nouns.....	11.0	9.8	10.0	9.2	9.0	9.1	10.1
Relational words.....	16.2	17.1	17.7	18.1	17.7	18.1	18.2
Verbs.....	16.1	16.0	18.4	18.2	18.6	18.1	18.4
Personal pronouns.....	10.4	10.1	10.9	11.0	11.1	11.0	11.1
Concrete nouns.....	10.8	10.2	10.9	10.6	10.2	10.4	10.3

TABLE 15

PERCENTAGES OF CERTAIN SIGNIFICANT WORDS APPEARING IN WRITTEN SAMPLES OF FIFTH-GRADE PUPILS AT SUCCESSIVE COUNTS OF GROUPS OF 300 WORDS

Part of Speech	Words Counted						
	300	600	900	1200	1500	1800	2100
Abstract nouns.....	12.4	12.0	11.2	11.0	11.3	11.2	11.0
Relational words.....	16.0	16.8	17.6	18.4	18.9	18.4	18.5
Verbs.....	17.1	18.0	17.3	17.6	17.9	17.4	17.6
Personal pronouns.....	10.6	11.1	10.9	11.3	11.5	11.1	11.5
Concrete nouns.....	11.1	9.6	11.4	10.9	11.2	11.2	11.2

TABLE 16

PERCENTAGES OF CERTAIN SIGNIFICANT WORDS APPEARING IN WRITTEN SAMPLES OF SIXTH-GRADE PUPILS AT SUCCESSIVE COUNTS OF GROUPS OF 300 WORDS

Part of Speech	Words Counted						
	300	600	900	1200	1500	1800	2100
Abstract nouns.....	12.2	13.0	12.6	12.1	12.1	12.0	12.0
Relational words.....	19.0	19.3	18.9	19.0	19.1	19.0	19.1
Verbs.....	16.7	17.6	17.0	17.3	17.0	17.2	17.2
Personal pronouns.....	8.5	11.0	10.8	10.0	10.6	10.5	10.5
Concrete nouns.....	9.4	11.1	10.6	10.2	10.2	10.0	10.3

and with most of the themes, this would mean using from ten to fourteen pupils in order to insure a reliable count for each theme, since the third-grade themes average around one hundred words each.

With this evidence it was decided to use the papers for twenty girls and twenty boys in each grade. With twenty papers for each sex, the count for each of the four themes should be reliable since approximately twice as many words are used as are necessary for consistency. When all four themes are combined the total number of words for each pupil is found to range from four hundred to six hundred. Thus when the percentages are based on all the papers from twenty pupils the total number of words included is from eight to twelve times the number found necessary in order to give consistent results.

Consistency of individual samples.--As to the quantity of writing needed from each individual in order to obtain a consistent pattern of language, it became obvious after tabulating the results of several hundred papers that each individual reveals his type of vocabulary in a relatively brief sample of his expression. To show just how consistent this type of vocabulary is, a tabulation was made of 64 of the most lengthy fourth-grade themes on the subject, "My Most Exciting Experience." These were each divided into approximate halves, and a count of prepositions, abstract nouns, adjectives, and subordinate conjunctions was made for each half. These were converted into percentages of the total word count of the theme. Correlations were next completed between halves.

Table 17 shows the results of these correlations, based on the product-moment method.

TABLE 17

CORRELATIONS BETWEEN PERCENTAGES OF CERTAIN TYPES OF WORDS FOUND IN HALVES OF 64 FOURTH-GRADE COMPOSITIONS

Prepositions	Abstract Nouns	Adjectives	Subordinate Conjunctions
.76 ± .036	.82 ± .027	.71 ± .042	.81 ± .029

Table 17 indicates that the pattern of language is quite similar in the two halves of any composition. Different topics, such as "How To Play My Favorite Game," call for a somewhat different style of vocabulary, yet the pattern is quite consistent throughout. Thus there is good evidence that one can judge from a sample of the child's expression whether his language is dominated by verbs or adjectives, or whether he makes extensive use of relational words or abstract nouns.

With the hard-of-hearing subjects, since their writing is somewhat less voluminous, especially at the lower grade levels, the number used was not limited to twenty. Instead, all the papers available were analyzed. In most instances the number ranged from eighteen to thirty-six for each sex at each grade level.

Supplementary data gathered.--Tables 13, 14, 15, and 16 show the frequency of occurrence of only five types of words. These are the most important for the present study but obviously they do not include all the words used in the expression of thought. Since, as was stated in chapter 1, all words are symbols and hence are forms of abstraction, it was thought desirable, while making the analysis, to record all the words and classify them as to their function in the sentence. Besides providing evidence for certain secondary features of the study, it was felt that by including all words in the analysis a more accurate count of the abstract and relational words could be made.

One part of speech, the interjection, was ignored because of its infrequent appearance within discourse and its apparent lack of significance for purposes of this study.

Plan of classification.--After some modifications of the original plans, the following classification was decided upon:

I. Nouns
  A. Concrete
  B. Abstract
    1. Sensory
      a) Color
      b) Position
      c) Shape
      d) Temperature
      e) Indefinite
    2. Non-Sensory
      a) Time
      b) Quantity
      c) Indefinite

II. Pronouns
  A. Personal
    1. First person
    2. Second person
    3. Third person
  B. Relative
  C. Interrogative

III. Adjectives
  A. Articles
  B. Color
  C. Demonstrative
  D. Descriptive
  E. Interrogative
  F. Quantitative
  G. Possessive
  H. Spatial

IV. Verbs
  A. Infinitives

V. Prepositions

VI. Adverbs
  A. Degree
  B. Manner
  C. Modal
  D. Place
  E. Time

VII. Conjunctions
  A. Coordinating
  B. Subordinating

Preposition errors
Conjunction errors
Time errors
Comparisons

This classification was made in tabular form on two rubber stamps so that each sample of writing could be stamped and the analysis placed directly on the sample.

The rather detailed divisions were made primarily for the purpose of aiding in the classification. Thus the different divisions of both sensory and non-sensory abstract nouns were set up more for the purpose of helping determine which words were abstract than for any other purpose. By using classifications relating to color, position, shape, temperature, time, and quantity it was easier to recognize words of an abstract nature. Also, since certain concepts such as those relating to time and quantity are held to be abstract, classifications of such words were made wherever possible, that is as nouns, adverbs, and adjectives.

Since, however, the abstract nouns and relational words are the most essential part of the present study, a more detailed explanation should be made concerning them.

Abstract nouns.--Of the types of words analyzed in this study, the ones about which there is the largest element of subjectivity are the abstract nouns. When one becomes conscious of

words, a tendency arises to see something abstract about all nouns save those which are most obviously concrete in nature. This being true it became necessary before starting the analysis to arrive at some rather general criterion by which one could judge as to whether a noun should be classed as abstract or concrete. It was decided that any word is abstract whose meaning is developed or determined by a process of generalized thinking. For example, the word "fight" used as a noun would be classed as abstract. It is a form of physical activity, but differs from other forms of physical activity in that it possesses certain essential characteristics such as a mental attitude and purpose, which are peculiar to it and which are not found in other forms of physical activity. Thus a form of generalizing must occur in order to distinguish "fight" from "play" or "game" or "walk," which are also forms of physical activity. By this criterion, "animal" is classified as an abstract word, since in order to understand its meaning the child must assemble all the characteristics which are common to all forms of specific animals such as "cats" and "dogs" and out of these common qualities develop a new and more general concept.

Looked at from a different point of view, a noun is concrete when it refers to a particular thing; it is abstract when it does not refer to a particular thing.

Abstract nouns were divided into two general classes, the sensory and non-sensory. Nouns of the first type are those whose meaning is dependent upon or derived from sensory content primarily. Examples of this type are such words as "top," "heat," "square," which in the foregoing classification would be classified under "position," "temperature," and "shape," respectively. Nouns of the non-sensory type are those which are more independent of any immediate sensory content, such as "minute," "morning," "half," and so forth.

Relational words.--Relational words in this study include the prepositions, the two forms of conjunctions, coordinating and subordinating, and the relative pronouns. These are the words whose function is to connect ideas and by so doing to indicate the relationship between the ideas thus connected.

Reliability of abstract word classification.--To test the accuracy of this method of classifying words as abstract, a small group of compositions, five in number, were duplicated in their original form and submitted to a group of judges who agreed to

list all the words which seemed to them to be "abstract." Six judges were used, all of them being teachers of deaf children. The classification used in this study, as shown on page 23, was given to them, together with a general statement of the criteria used by the writer as stated above. The six individual lists of abstract words submitted by the judges were then compared with each other and with the writer's own list which had been previously prepared. In this original list there were 110 abstract words. The percentage of error was computed by considering as an error either an omission from the writer's list or an addition to the list. Thus the judgments of all six judges were compared with a single standard.

The results in terms of percentages of agreement with the writer's list are shown in Table 18.

TABLE 18

PERCENTAGE OF AGREEMENT FOR EACH OF SIX JUDGES IN SELECTION OF ABSTRACT WORDS FROM WRITTEN COMPOSITION

	Judges					
	A	B	C	D	E	F
Percentage of agreement....	84	92	92	95	81	90

Thus, of a total of 660 judgments, excluding a vast number of wrong judgments which might have been made through the addition of other words than those on the original list, 587, or 89 per cent, were correctly made. Approximately 70 per cent of the errors made were errors of omission from the writer's list rather than errors caused by including words which were not on this list.

The writer recognizes that the foregoing classification of words is but one of several such classifications that could be made. As stated, however, the chief purpose in making a detailed classification was to establish an aid in selecting the abstract names and relational words and in eliminating all others from consideration. The list of words used for a comparison of judgments in Table 18 cannot be thought of, therefore, as a "standard" except in a subjective and arbitrary sense. That there is considerable agreement on the words, however, indicates that the criterion for determining "abstractness" is one which was generally understood and which should yield considerable consistency.

Frequency as a criterion.--Frequency of occurrence with reference to the total volume of words used was taken as the index of the importance of the part played by a particular part of speech in the thinking process. Since this is not a vocabulary study, each word was counted as many times as it appeared. If the individual used a conjunction to express a relationship and later repeated that word, it was considered as providing as much evidence of abstraction as would have been provided if a substitute word of the same general nature had been used. Some preliminary study showed that while there is duplication among relational words and abstract nouns, there is no evidence that these are duplicated either more or less frequently, in proportion, than other types of words. Among the relational words, most frequent duplication is perhaps found among the coordinating conjunctions. Where such words were used without expressing any clear or necessary relationship they were not considered as relational words.

Completion Data

For the second type of data, a completion test consisting of sixty-five statements was used. This test is reproduced in the Appendix. The statements chosen for use were such that the vocabulary and the two or more facts which were related in each one were within the understanding of pupils at each grade level. The proper relationship of the facts as to cause, effect, or other factors was made the variable factor.

The relational words which were used were obtained by asking twelve teachers in the Wisconsin School for the Deaf to submit tests of relational words used in sentences the meaning of which were within the comprehension of deaf pupils at the different grade levels under investigation. From the seven hundred sentences submitted, those most frequently occurring at each grade level were chosen for the test of sixty-five statements. Since the writer found from observation that the teaching of relational words is a problem of which teachers of the deaf are definitely conscious, it was felt that if the test could be put within the comprehension of deaf subjects, it would be also within the range of the normal subjects. Preliminary trials bore out this assumption.

After repeated tests, three revisions of the test were made. In its final form the test consisted of thirty-two relational words, each of which was found to be used correctly by an

increasing percentage of pupils at successive grade levels. The following relational words were used, each appearing at least twice in the test:

after	for	when
although	if	where
as	more--than	whether
as--as	not only--but also	which
as if	since	while
both--and	so	who
before	so--that	whose
because	that	why
but	unless	yet
but--also	until	
either--or	what	

In the analysis of results these words were classified into six divisions: cause, result, condition, concession, comparison, and time. In some instances other words than the one intended could be used equally well and thus change the original meaning and classification intended for that statement. In such cases no error was counted, but if the statement did not make sense or the relationship was an incorrect one, then the error was classified under the heading originally planned for the statement when it was constructed.

CHAPTER IV

GENERAL ANALYSIS OF DATA OF NORMAL CHILDREN

Method of Comparison

Grouping of pupils.--Table 16 presented the total amount of data analyzed for two hundred pupils, fifty from each of the four grades studied. From this group of two hundred pupils, four different groups were arranged. For the first part of the study twenty pupils were selected from among the boys of each grade who were approximately equal in intelligence to a group of twenty girls from that grade and also equal to similar groups from the other three grades. This was done by pairing the individuals so that there were among both boys and girls twenty sets of four individuals each. Within each set the intelligence quotients varied within a range of three points. Three factors, sex, school grade, and intelligence quotient, thus were made constant. On the basis of this method of grouping, a number of comparisons were made possible. These will be presented in this chapter.

Comparison of word totals.--As stated earlier, the analysis made of the written materials included practically every word. As a result some of the data in succeeding tables are only supplementary to the main objectives which are concerned with abstract nouns and relational words.

In order to show the extent of the analysis and to present a sample summary sheet containing the raw data for one group, Table 19 is presented on the following page.

Of the items in Table 19 the present study is concerned only incidentally in numbers 22, 23, 24, and 25, which relate to sentence structure and length. Of the first twelve items, numbers 5, 6, and 12 have little significance. Further mention will not be made of these items save as they contribute to certain general conclusions later in the study.

Total number of words serves no purpose here for comparison. Table 19 does, however, indicate a general trend with reference to the topics upon which pupils express themselves best. For

practically every grade, and with both normal and hard-of-hearing pupils, the most writing was done on "My Most Exciting Experience," followed closely by "How To Play My Favorite Game."

TABLE 19

SUMMARY TABLE OF LANGUAGE ACTIVITIES ANALYZED FOR THIRD-GRADE NORMAL BOYS

Items Analyzed	Title of Composition				Total
	Old Penny	How To Play	Exciting Experience	Why I Like	
Nouns Concrete.....	242	328	277	206	1053
Abstract Sens.	60	99	53	70	282
Abst. Non-Sens.	48	61	56	73	238
Pers. Pro.	151	188	271	206	816
Verbs.....	228	387	363	327	1305
Infinitives.....	15	51	69	45	180
Adjectives.....	261	338	246	171	1016
Prepositions.....	91	111	126	108	436
Coord. Conj.	60	79	72	107	318
Subord. Conj.	12	37	38	42	129
Rel. Pro.	4	17	5	0	26
Adverbs.....	68	46	182	130	426
No. Words Analyzed...	1240	1742	1758	1485	6225
No. Relational Words.	167	244	241	257	909
% Relational Words are of Total.....	12.8	14.0	13.7	17.3	14.6
Time Errors.....	2	3	1	2	8
Conj. Errors.....	1	2	2	1	6
Prep. Errors.....	2	1	2	0	5
Comparison.....	...	...	7	18	25
Total No. Sent.	126	142	164	147	579
Av. Length Sent.	11.5	13.7	11.9	11.7	12.2
Compound Sent.	10	15	27	31	83
Complex Sent.	14	41	26	29	110
% of Sentences Complex and Comp..	19.0	39.4	32.3	41.0	33.3
% of Sentences Complex.....	11.1	28.9	15.8	19.7	19.0

Comparison of percentages.--By converting totals to percentages, the data of Table 19 may be made to indicate certain trends with reference to the relative importance of various parts of speech in carrying on the thought processes. The first twelve items of Table 19 are therefore reproduced in terms of percentages in Table 20.

Much of the significance of Table 20 can best be shown by a comparison with similar data from other grade levels, and from deaf pupils. Since this, however, is the basic data upon which

much of the study is based, attention should be directed to some of its features.

TABLE 20

PERCENTAGE OF VARIOUS PARTS OF SPEECH APPEARING IN WRITTEN COMPOSITIONS OF THIRD-GRADE BOYS

Items Analyzed	Title of Composition				Total
	Old Penny	How To Play	Exciting Experience	Why I Like	
Nouns Concrete.....	19.5	18.8	15.8	13.9	17.0
Abstract Sens.	4.8	5.7	3.0	4.7	4.5
Abst. Non-Sens.	3.9	3.5	3.2	4.9	3.8
Pers. Pro.	12.2	10.8	15.4	13.9	13.1
Verbs.....	18.4	22.2	20.7	22.0	21.0
Infinitives.....	1.2	2.9	3.9	3.0	2.9
Adjectives.....	21.1	19.4	14.0	11.5	16.3
Prepositions.....	7.3	6.4	7.2	7.3	7.0
Coord. Conj.	4.8	4.5	4.1	7.2	5.1
Subord. Conj.	1.0	2.1	2.2	2.8	2.1
Rel. Pro.	.3	1.0	.3	...	.4
Adverbs.....	5.5	2.6	10.4	8.7	6.9
% Relational Words are of Total.....	12.8	14.0	13.7	17.3	14.6

Third-grade pupils express themselves largely in terms of concrete nouns, verbs, adjectives, and personal pronouns. Changes in the relative proportion of these with age will indicate something of the changes in complexity of thought. The two items of most significance in Table 20 are the abstract nouns and relational words. Included in the latter groups are the propositions, conjunctions, and relative pronouns. Of the conjunctions, the coordinating are used twice as frequently as the subordinating. Thus, cause, effect, time sequence, and the various relationships expressed by subordinating conjunctions are apparently much less frequently used in the thought processes at this level than are the coordinating conjunctions which are used largely for purposes of combining ideas with little reference to any complex relationships.

In the realm of abstract nouns, those having a sensory content are more frequently used than those having no sensory content.

Relative pronouns have barely made their appearance in the written expression of third-grade pupils. The major portion

(80 per cent) of relational words used by boys at this level are the prepositions and coordinating conjunctions. While these are relational in character, there is a question as to whether they are as complex as the other two forms classified in Table 20. This latter question may be partially answered by later comparisons made in this study.

Growth in Usage of Abstract Nouns

Use of abstract sensory nouns.--In order to arrive at any conclusions concerning the development of abstract concepts in language, it will be necessary to focus attention on six of the items of Table 20 and consider their status at each grade level for both boys and girls. The six items of most importance here are the abstract nouns, both sensory and non-sensory, and four forms of relational words--prepositions, coordinating conjunctions, subordinating conjunctions, and relative pronouns.

The relative importance of each of these at each grade level in the four different topics is shown in the following tables.

TABLE 21

PERCENTAGE OF ABSTRACT SENSORY NOUNS USED BY BOYS AND GIRLS IN GRADES III, IV, V, AND VI IN FOUR COMPOSITION TOPICS

Grade	Topic								Total	
	Old Penny		How To Play		Exciting Experience		Why I Like			
	B	G	B	G	B	G	B	G	B	G
III.....	4.8	4.7	5.7	7.4	3.0	4.8	4.7	4.2	4.5	5.2
IV.....	5.2	4.6	6.7	8.3	3.2	4.7	5.7	5.7	5.1	5.8
V.....	5.7	5.4	7.6	8.7	3.4	4.9	5.4	6.7	5.4	6.4
VI.....	6.4	6.7	8.0	9.4	3.8	5.3	6.1	7.4	6.0	7.1

Development of the use of abstract sensory nouns is less consistent with the girls than with the boys. The comparable feature of the two groups is that in both the growth is still in progress at the sixth-grade level. In Table 21 is shown only three instances in which the percentage of nouns is smaller than in the preceding grade. This is true in only one instance with

the data for the boys. With both groups there is the largest usage of nouns in the topic, "How To Play...," and the smallest number is found in "My Most Exciting Experience." As a whole, the larger increases in the use of abstract words come at the fourth- and sixth-grade levels, with a smaller increment at the fifth-grade level.

Abstract non-sensory nouns.--While the present study is not primarily concerned with the distinction between the sensory and non-sensory nouns, nevertheless a comparison between the two shows some significant similarities.

Data for the boys and girls are shown in Table 22.

TABLE 22

PERCENTAGE OF ABSTRACT NON-SENSORY NOUNS USED BY BOYS AND GIRLS IN GRADES III, IV, V, AND VI IN FOUR COMPOSITION TOPICS

Grade	Topic								Total	
	Old Penny		How To Play		Exciting Experience		Why I Like			
	B	G	B	G	B	G	B	G	B	G
III.....	3.9	4.0	3.5	5.4	3.2	2.1	4.9	6.6	3.8	4.4
IV.....	4.2	4.0	4.2	5.4	4.8	2.9	6.3	8.7	4.8	5.1
V.....	4.4	4.2	4.7	5.9	5.8	3.4	7.6	9.2	5.6	5.6
VI.....	5.0	4.8	4.9	6.9	6.9	4.5	8.4	10.4	6.2	6.4

In the use of non-sensory abstract nouns the topics which involve the largest proportion of such words are the two which in Table 21 were shown to contain the smallest proportion of sensory abstract words. "Why I Like Summer" and "My Most Exciting Experience" involve a larger number of abstract words with little or no sensory content. For the boys the amount of increase from grade to grade shows a negative acceleration for the total number of words on all topics and also for the individual topics with the exception of the first. There is evidence that development is still continuing after the sixth-grade level. This is true for the sensory nouns also.

From a comparison of the data for the boys and girls, two important facts should be noted. First, there is a slower rate of development at the early grades for the girls. In two of the

topics there was no increase at all between the third and fourth grade. The total percentage of increase at this period is only slightly more than half that of the boys. A second point of comparison which may prove significant is that the girls are continuing their growth at a more rapid rate at the sixth-grade level than are the boys.

Sex differences in all abstract nouns.--Irregularities in the two preceding tables can be partially eliminated by combining the two types of nouns. Since the present study is concerned primarily with the growth in usage of abstract nouns, and only incidentally with the two classes of nouns, such a combination of the data seems justifiable.

Data for both boys and girls are shown in Table 23.

TABLE 23

TOTAL PERCENTAGE OF ABSTRACT SENSORY AND NON-SENSORY NOUNS USED BY BOTH BOYS AND GIRLS IN GRADES III, IV, V, AND VI IN EACH OF FOUR TOPICS

Grade	Topic								Total	
	Old Penny		How To Play		Exciting Experience		Why I Like			
	B	G	B	G	B	G	B	G	B	G
III.....	8.7	8.7	9.2	12.9	6.2	6.8	9.6	10.8	8.3	9.6
IV.....	9.4	8.6	10.9	13.7	8.0	7.6	12.0	14.4	9.9	10.8
V.....	10.1	9.6	12.3	14.6	9.2	8.3	13.0	15.9	11.0	12.0
VI.....	11.4	11.3	12.9	16.3	10.7	9.8	14.5	17.8	12.2	13.5

At the fourth-, fifth-, and sixth-grade levels in the story of "The Old Penny" and "My Most Exciting Experience" the boys show a very slight superiority over the girls. Elsewhere the girls use a larger proportion of abstract nouns than do the boys.

To make a more adequate comparison of the rate of development at different levels, the totals of Table 23 are presented in Table 24 for further analysis.

When the totals are analyzed it is found that the boys show their greatest increase at the fourth grade, but with a steadily diminishing rate at each of the succeeding levels. The percentages, 19.3, 11.1, and 10.9 indicate a negative rate of

acceleration. The girls, on the other hand, show an almost constant rate of growth, the percentages of increase being 12.4, 11.1, and 12.5. Thus the aforementioned trend of an earlier growth for the boys followed by an earlier decline is borne out in the totals for all abstract nouns. Not to be overlooked in both the boys' and girls' data is the quite obvious fact that growth in usage of abstract nouns is definitely on the increase at the end of the age level included in the present study.

TABLE 24

TOTAL PERCENTAGE OF ALL ABSTRACT NOUNS USED BY BOTH BOYS AND GIRLS IN GRADES III, IV, V, AND VI WITH PERCENTAGE OF INCREASE AT EACH GRADE

Grade	Total Percentage		Difference	Percentage of Increase	
	G	B	G - B	G	B
III.....	9.6	8.3	1.3	...	...
IV.....	10.8	9.9	.9	12.4	19.3
V.....	12.0	11.0	1.0	11.1	11.1
VI.....	13.5	12.2	1.3	12.5	10.9

Growth in usage of relational words.--Concrete and abstract nouns represent the things and ideas about which people talk and with which they carry on thinking. The relationships among these things and ideas are expressed by words which are abstract in nature. A casual analysis of this sentence or of the preceding sentence makes one aware of the part which such relational words play in adult expression. The present study attempts to trace the growth of the four types of relational words which have been called prepositions, coordinating conjunctions, subordinating conjunctions, and relative pronouns. Data will be presented for these four.

Preposition as relational words.--Table 25, on the following page, presents the data showing the growth in usage of prepositions.

In the total number of prepositions used, there is an indication in Table 25 that the period of most rapid development in their usage is between the third- and the fourth-grade level, and by the time the sixth grade is reached there is even a slight

decline in usage in some instances. Table 25, when compared with the data presented in the three following tables, gives reason to believe that prepositions are the first form of relational words to be used in quantity and that their relative importance decreases with age after the fifth grade is reached. In total number of prepositions used, the girls show a slightly larger increase at the sixth-grade level than do the boys.

TABLE 25

PERCENTAGE OF PREPOSITIONS USED BY BOYS AND GIRLS IN GRADES III, IV, V, AND VI IN FOUR COMPOSITION TOPICS

Grade	Topic								Total	
	Old Penny		How To Play		Exciting Experience		Why I Like			
	B	G	B	G	B	G	B	G	B	G
III.....	7.3	9.2	6.4	6.2	7.2	6.8	7.3	7.2	7.0	7.3
IV.....	9.9	10.5	7.3	6.5	9.0	8.0	9.5	10.2	8.8	9.2
V.....	10.1	11.5	7.9	7.4	9.3	8.7	10.7	10.2	9.5	9.5
VI.....	12.1	12.1	8.1	8.3	9.1	9.5	10.3	10.0	9.7	10.0

Coordinating conjunctions as relational words.--While few in number, the coordinating conjunctions assume considerable importance at a rather early age. This is notably true of the simple connective "and" which doubtless accounts for a large share of all such conjunctions used. The following tables show the growth in usage for both boys and girls.

The most obvious characteristic of Table 26 is the inconsistency in the growth of use of coordinating conjunctions. In general, the progress of their development is similar to that of the prepositions. Their importance fluctuates greatly with different topics, but in the total number for all topics the fifth grade is the maximum level of usage for the boys. Thereafter there is a slight decline. Inconsistency in development, together with an early decline in rate of growth, suggests that coordinating conjunctions, like prepositions, are among the first of the relational words to play an important part in expression. Likewise they may be among the first to reach their maturity. The most noticeable point of comparison in Table 26 is the larger number of coordinating conjunctions used by the boys at every grade level and in every topic.

TABLE 26

PERCENTAGE OF COORDINATING CONJUNCTIONS USED BY BOYS AND GIRLS IN GRADES III, IV, V, AND VI IN FOUR COMPOSITION TOPICS

Grade	Topic								Total	
	Old Penny		How To Play		Exciting Experience		Why I Like			
	B	G	B	G	B	G	B	G	B	G
III.....	4.8	3.6	4.5	4.1	4.1	4.8	7.2	4.5	5.1	4.3
IV.....	4.8	3.8	5.0	4.3	4.6	4.8	6.7	4.1	5.6	4.3
V.....	5.9	4.2	5.4	4.4	5.1	4.9	7.4	5.3	5.8	4.7
VI.....	4.6	3.9	5.1	4.7	5.7	5.0	7.0	5.0	5.5	4.7

Subordinating conjunctions.--Subordinating conjunctions, while used much less frequently than the coordinating, particularly at the earlier levels, show a more consistent development. Data showing their development are presented in Table 27.

TABLE 27

PERCENTAGE OF SUBORDINATING CONJUNCTIONS USED BY BOYS AND GIRLS IN GRADES III, IV, V, AND VI IN FOUR COMPOSITION TOPICS

Grade	Topic								Total	
	Old Penny		How To Play		Exciting Experience		Why I Like			
	B	G	B	G	B	G	B	G	B	G
III.....	1.0	1.6	2.1	1.6	2.2	2.5	2.8	2.9	2.1	2.2
IV.....	1.2	1.9	2.4	3.3	2.5	3.0	4.4	3.2	2.6	3.0
V.....	1.7	2.1	3.9	3.5	2.9	3.1	5.0	3.5	3.3	3.1
VI.....	2.4	3.0	4.0	3.6	3.1	4.0	5.3	4.3	3.6	3.7

Table 27 indicates some significant facts with reference to the trend of growth for boys and girls. For the boys, there is a fairly large increase between the third- and the fourth-grade level and between the fourth and fifth, with a noticeable decline in rate between the fifth and sixth. The one exception to this is found in the case of "This Old Penny," where the number of subordinating conjunctions used was very small and the rate of development from grade to grade somewhat inconsistent when compared with

the other topics and with the total. In contrast with the boys, the girls show a rapid growth between the fifth and sixth grade. Apparently the same tendency as was found in the use of abstract nouns is to be noted here, namely, the somewhat slower development of usage at the earlier years with an accompanying later level of maturity. Girls use a larger percentage of subordinating conjunctions than do the boys, at the levels studied here, and judging from their more rapid rate of increase at the higher levels, one might reasonably assume that the difference would be still greater as maturity is approached. The data give no definite proof that this would be true, however.

Relative pronouns.--The fourth and final type of relational word to be presented is the relative pronoun. From the standpoint of quantity it is the least important of the four types, yet there is reason to doubt that its significance can be judged on that basis alone.

Table 28 shows the rate of growth for the boys and girls.

TABLE 28

PERCENTAGE OF RELATIVE PRONOUNS USED BY BOYS AND GIRLS IN GRADES III, IV, V, AND VI IN FOUR COMPOSITION TOPICS

Grade	Topic								Total	
	Old Penny		How To Play		Exciting Experience		Why I Like			
	B	G	B	G	B	G	B	G	B	G
III.....	.3	.5	1.0	.6	.3	.1	...	.1	.4	.3
IV.....	.5	.5	1.1	.9	.3	.2	.2	.1	.5	.4
V.....	.5	.5	1.3	1.5	.5	.5	.2	.3	.6	.7
VI.....	.9	.6	1.6	2.1	.5	.5	.4	1.2	.9	1.0

Relative pronouns have scarcely made their appearance in the written expression of third-grade boys. In one series of compositions in the third grade none were found. In nearly every topic in which the boys wrote the number of relative pronouns used at the sixth-grade level was practically double that at the third. In the total for all topics the number was more than doubled during the four grades. Periods of greatest increase are somewhat inconsistent, because of the small quantity, perhaps, but in general there is ample evidence that relative pronouns have not reached

anything like their maximum growth in the period studied here. For the girls the age levels at which greatest growth occurs vary with the different topics, with the greatest increase tending to come at the fifth grade, as contrasted with the sixth grade for the boys. Girls also use a larger percentage of relative pronouns at the third-grade level than do the boys. The two groups are comparable in that both apparently have not reached their maximum in the use of their forces of relational words at the sixth-grade level.

Summary of relational words.--As mentioned earlier in this chapter, this study is concerned with relational words as a class, rather than with the four specific types presented in the tables just presented.

A summary of the four types for both the boys and girls should give a more consistent picture of the comparative development within the two groups than do the data for the specific types alone. With this purpose in view, such a comparison is shown in Table 29.

TABLE 29

TOTAL PERCENTAGE OF ALL RELATIONAL WORDS USED BY BOTH BOYS AND GIRLS IN GRADES III, IV, V, AND VI IN EACH OF FOUR TOPICS

Grade	Topic								Total	
	Old Penny		How To Play		Exciting Experience		Why I Like			
	B	G	B	G	B	G	B	G	B	G
III.....	12.8	14.9	14.0	12.5	13.7	14.2	17.3	14.7	14.6	14.1
IV.....	16.4	16.7	15.9	15.1	16.3	15.9	20.1	17.6	16.9	16.2
V.....	18.1	18.4	18.5	16.8	17.8	17.2	23.1	19.2	19.2	17.9
VI.....	20.0	19.7	18.8	18.6	18.4	19.0	25.6	23.6	20.2	20.0

In the four topics and in the totals for all topics, in Table 29, there are twenty possible comparisons of the boys and girls at similar grade levels. Of these twenty, the boys excel in the percentage of relational words used in fifteen instances and the girls in only five. In the totals, which should have most significance, the boys excel slightly at each grade level. Both groups show a rather steady increase from grade to grade, with growth apparently still proceeding at a rather rapid rate at the sixth-grade level.

To compare the rates of development at different grade levels, the totals of Table 29 are presented for further analysis in Table 30.

TABLE 30

TOTAL PERCENTAGE OF ALL RELATIONAL WORDS USED BY BOTH BOYS AND GIRLS IN GRADES III, IV, V, AND VI WITH PERCENTAGE OF INCREASE AT EACH GRADE

Grade	Total Percentage		Difference	Percentage of Increase	
	B	G	B - G	B	G
III.....	14.6	14.1	.5	...	...
IV.....	16.9	16.2	.7	15.8	14.9
V.....	19.2	17.9	1.3	13.6	10.5
VI.....	20.2	20.0	.2	5.2	11.7

It is apparent that the boys have a superiority here, although the differences are not large at any grade level. The most significant conclusion to be drawn from the data in Table 30 is that the rate of growth for girls is somewhat gradual with a slightly more rapid rise at Grade VI, whereas the boys, while slightly superior in the total percentage of relational words used at this level, have apparently reached a point where rate of growth is proceeding negatively. It will be recalled that a similar conclusion was made concerning the abstract nouns, presented in Table 24.

Statistical Significance of Data

All comparisons and measures of differences between the boys and girls as groups, as well as between the different grade levels, have up to this point been made in terms of the total percentage of words of the various types used by all the subjects. Since the analysis was an intensive one, involving a somewhat large sampling of each subject's expression, it was found impossible to use numerically large numbers of subjects. As pointed out earlier, however, it was found possible to obtain consistent individual results with a much smaller quantity of data than was actually used.

To determine the significance of the essential differences which have been pointed out in the preceding tables of this chapt the individual percentages in the two main types of words under consideration were arranged in frequency distributions and analyze The two types are: (1) abstract nouns, both sensory and non-sensory, and (2) relational words.

Abstract nouns.--Obviously with forty subjects, equally divided between the boys and girls, wide variations would occur i the average within any of the four topics upon which the subjects expressed themselves. By using the total amount of expression for each subject, in all four topics, and by combining the two forms of abstract nouns and also the four forms of relational words, these variations tend to become much smaller.

Table 31 shows the mean percentage of abstract words for both boys and girls at each grade level.

TABLE 31

MEAN PERCENTAGE OF ALL ABSTRACT NOUNS USED BY BOYS AND GIRLS IN GRADES III, IV, V, AND VI

Grade	Boys		Girls		Total	
	Mean	P.E.	Mean	P.E.	Mean	P.E.
III.....	8.38	.38	9.03	.47	8.70	.30
IV.....	10.01	.34	10.85	.35	10.44	.25
V.....	11.2	.40	12.1	.23	11.62	.23
VI.....	12.1	.29	13.2	.25	12.62	.21

Obviously the mean percentage for each grade does not necessarily correspond with the total percentage of abstract words as shown in Table 25, although in most instances there is fairly close agreement. When the mean percentage of abstract nouns is considered, the same general tendencies are apparent as were pointed out in the discussion of the percentages in Table 26, namely, an early acceleration in growth for the boys, followed by a gradual decline, and a rather gradual increase for the girls with little evidence of a decline even at the sixth-grade level.

The data of Table 32 also give evidence that the variability in usage of abstract nouns is decreasing with each succeeding grade level. The mean for the girls is in each grade higher than that for the boys, as was shown in the total percentage in Table 25.

The statistical significance of this difference is shown in Table 32.

TABLE 32

SEX DIFFERENCES IN MEAN PERCENTAGE OF ABSTRACT NOUNS USED IN GRADES III, IV, V, AND VI

Grade	$M_g - M_b$	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$
III.....	.65	.59	1.1
IV.....	.92	.49	1.9
V.....	.90	.46	1.95
VI.....	1.1	.38	2.9

From Table 32 it is apparent that the difference between boys and girls in the use of abstract words, while showing a numerical superiority for the girls at each grade level, is in no case a completely reliable difference. There is, however, a consistent difference, in favor of the girls, and some indication that this difference is approaching significance as the upper grade levels are reached. The chances that the girls excel the boys range from 77 out of 100 in Grade III to 97.5 out of 100 in Grade VI.

Grade differences in abstract nouns.--Of more interest than sex differences for the present study are the differences in grade levels. Table 24 showed a gradual increase in percentage of abstract nouns at each succeeding grade level. The statistical significance of these differences in terms of the mean percentage for each grade is shown in Table 33.

Grade differences in abstract nouns are thus seen to approach a significant amount, particularly between the third and fourth grades for boys and for girls, and between the fifth and sixth grades for the girls. This again corresponds to the general trends mentioned in the comment on Table 31 concerning the evidence of an earlier acceleration and earlier cessation of growth for the boys and a longer and more steady growth for the girls. In the three comparisons involving groups differing by two grades rather than one, the differences are in every case more than sufficient to insure reliability.

By combining the mean percentages for boys and girls in the same distribution and computing the mean at each grade level, as shown in Table 31, less variability should result in the grade difference.

TABLE 33

GRADE DIFFERENCES IN MEAN PERCENTAGE OF ABSTRACT NOUNS USED IN GRADES III, IV, V, AND VI

Grades Compared	Boys			Girls		
	Diff.	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$	Diff.	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$
$M_{iv}-M_{iii}$..	1.63	.49	3.3	1.9	.59	3.2
$M_{v}-M_{iv}$...	1.19	.52	2.3	1.17	.42	2.8
$M_{vi}-M_{v}$....	.9	.49	1.8	1.1	.34	3.2
$M_{v}-M_{iii}$..	2.82	.54	5.2	3.07	.52	5.9
$M_{vi}-M_{iv}$...	2.09	.49	4.3	2.27	.42	5.4
$M_{vi}-M_{iii}$..	3.72	.46	8.1	4.17	.53	7.9

Table 34 shows the amount and reliability of such differences.

TABLE 34

GRADE DIFFERENCES IN MEAN PERCENTAGE OF ABSTRACT NOUNS USED BY BOTH BOYS AND GIRLS COMBINED IN GRADES III, IV, V, AND VI

Grades Compared	Diff.	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$
$M_{iv}-M_{iii}$.....	1.74	.39	4.46
$M_{v}-M_{iv}$.....	1.18	.34	3.5
$M_{vi}-M_{v}$.....	.89	.31	2.9
$M_{v}-M_{iii}$.....	2.92	.38	7.7
$M_{vi}-M_{iv}$.....	2.07	.33	6.3
$M_{vi}-M_{iii}$.....	3.81	.37	10.3

While the absolute differences between the means at the different grade levels are similar to those shown in Table 33, the differences are more reliable because of the decreased variability which resulted from the use of twice as many subjects as were used in computing the means compared in Table 33. The net result is a statistically reliable difference between the third and fourth grades and a difference which closely approaches a reliable difference between the fourth and fifth and the fifth and sixth grades.

Statistical significance of relational words.--The four forms of relational words were combined in the same manner as was done for the abstract nouns. The four topics upon which each of the subjects wrote were combined and the percentage of relational words was determined, using the total number of words written as the base. The mean percentage was then computed for boys and for girls and for the two groups combined.

Table 35 shows the mean percentage of all relational words used by the boys and girls at each grade level.

TABLE 35

MEAN PERCENTAGES OF ALL RELATIONAL WORDS USED BY BOYS AND GIRLS IN GRADES III, IV, V, AND VI

Grade	Boys		Girls		Total	
	Mean	P.E.	Mean	P.E.	Mean	P.E.
III.....	14.54	.51	14.21	.43	14.4	.36
IV.....	17.07	.42	16.34	.29	16.74	.27
V.....	19.33	.31	18.12	.31	18.76	.21
VI.....	20.15	.26	20.13	.23	20.15	.23

It should be pointed out that the general trends of growth curves for relational words for the boys and for the girls are quite similar to those for the abstract words and those trends were pointed out previously, that is, a more rapid early growth for the boys than for the girls and a more decided decrease in growth at the upper grade level for the boys. The second fact of importance to be noted from Table 35 is the slight superiority of the boys at each grade level. The variability of scores for both groups decreases rather consistently from grade to grade.

The statistical significance of these differences is shown in Table 36.

TABLE 36

SEX DIFFERENCES IN MEAN PERCENTAGE OF RELATIONAL WORDS USED IN GRADES III, IV, V, AND VI

Grade	$M_b - M_g$	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$
III.....	.33	.667	.49
IV.....	.63	.51	1.24
V.....	1.21	.44	2.75
VI.....	.02	.35	.057

The lack of any consistent increase or decrease in the absolute amount of difference in the means of the boys and girls in Table 36, or in the reliability of the difference, gives cause for doubt as to whether the apparent superiority of the boys' scores may be due to real causes or to chance factors. The significant feature of the data of Table 36 is found in the fact that the earlier growth period for the boys, followed by the earlier decline, as commented upon previously, serves to nullify the difference between the boys and girls at the upper age levels. In the abstract words, with the girls' scores being larger, this same factor of course accentuated the difference with each advancing grade.

Grade differences in relational words.--As was true in the case of the abstract words, the grade differences are of more importance here than are the sex differences. The statistical significance of the differences shown in Table 35 is shown in Table 37.

Grade differences in the use of relational words are more pronounced than in the use of abstract words. The differences between successive grades in Table 42 are significant in five of the six comparisons made possible. In the comparisons of groups differing by two grades rather than by one, the differences are in every case larger than necessary to insure reliability.

The most important features of Table 37, aside from the rather consistent grade differences, are the reliability of the differences in the means for the boys between the third and fourth and the fourth and fifth grades, and the lack of any such reliable

difference between Grades V and VI. With the girls' data the reliability increases at the upper grade levels. This feature has been consistent throughout the analysis of both abstract and relational words.

TABLE 37

GRADE DIFFERENCES IN MEAN PERCENTAGE OF RELATIONAL WORDS USED IN GRADES III, IV, V, AND VI

Grades Compared	Boys			Girls		
	Diff.	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$	Diff.	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$
$M_{iv}-M_{iii}$..	2.53	.66	3.83	2.13	.56	3.8
$M_{v}-M_{iv}$...	2.26	.52	4.35	1.78	.42	4.2
$M_{vi}-M_{v}$....	.82	.40	2.05	2.01	.39	5.2
$M_{v}-M_{iii}$..	4.79	.60	7.98	3.91	.53	7.4
$M_{vi}-M_{iv}$...	3.08	.49	6.3	3.79	.37	10.2
$M_{vi}-M_{iii}$..	5.61	.57	9.8	5.92	.49	12.1

Since the sex differences were shown in Table 36 to be relatively insignificant, more meaningful grade differences can be shown by computing the mean for both groups together at each grade level. These differences are shown in Table 38.

TABLE 38

GRADE DIFFERENCES IN MEAN PERCENTAGE OF RELATIONAL WORDS USED BY BOYS AND GIRLS COMBINED IN GRADES III, IV, V, AND VI

Grades Compared	Diff.	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$
$M_{iv}-M_{iii}$.....	2.34	.45	5.2
$M_{v}-M_{iv}$.....	2.02	.34	5.9
$M_{vi}-M_{v}$.....	1.39	.31	4.5
$M_{v}-M_{iii}$.....	4.36	.42	10.4
$M_{vi}-M_{iv}$.....	3.41	.36	9.5
$M_{vi}-M_{iii}$.....	5.75	.43	13.4

Some of the irregularities of growth which were apparent in an analysis of both the boys' data and the girls' data in Table 37, are smoothed out by combining the data. The result is a steadily decreasing difference between the means from lower to higher grades. Likewise there is a decrease in the variability, as shown in Table 37, which, of course, results in a smaller probable error in the grade differences. The net result of these two factors is a statistically reliable difference in each instance between one grade and the next higher.

General conclusions.--A general analysis of the preceding data points to two general conclusions, both of which have to do with the apparent rate of growth in the usage of abstract and relational words. These principles have been mentioned in various instances throughout the presentation of data, but since they have been consistent and are significant for this study, they will bear repeating.

The first is the lack of any significant sex differences. This is particularly striking in the abstract words, and it approaches reliability in only one instance, at the fifth grade, in the relational words. Thus it appears that whatever language differences there are between the two groups at these particular levels are somewhat small, but that they favor the girls in the case of the abstract nouns and the boys in the use of relational words.

The second conclusion justified by the evidence presented is that there is a difference in the age of development of these two types of language expression. The boys make a more decided increase in growth at the early grade levels, the third and fourth, and a smaller increase at the upper grade levels. The girls, on the contrary, make a more steady growth, with practically the same increment at the upper as at the lower grade levels. This principle of a different growth period for the two sexes in a sense makes it unsafe to predict from the study of this cross-section of growth just what the final outcome would be at maturity with reference to the superiority of either sex in the use of abstract and relational words. Since the girls excel at all levels in the use of abstract words and are developing steadily at the close of the period included in the present study, one would seem to be justified in predicting final superiority in that usage. With relational words, the sex differences are small and very variable,

but at the sixth grade the girls are rapidly overtaking the boys, and their rate of increase gives some indication that if one more grade were included they would excel the boys.

CHAPTER V

ANALYSIS OF DATA OF DEAF CHILDREN

Chapter v traced the development of the usage of abstract nouns and relational words in forty normal children at each grade level from three to six, inclusive. Both sex differences and grade differences were determined.

It is the purpose of this chapter to present a similar analysis for hard-of-hearing children at corresponding grade levels. Because it was suspected that there might be more variability among the hard-of-hearing than among the normal, a larger group of subjects was used. Table 4 showed the total number to be 257, distributed among the four grades as follows: third grade, 51; fourth grade, 73; fifth grade, 61; sixth grade, 72.

The tables which follow will show the status of the hard-of-hearing pupils in each grade with reference to abstract nouns and relational words.

Abstract Nouns Used by the Deaf

Table 39 shows the extent to which abstract sensory nouns are used by hard-of-hearing pupils in the third, fourth, fifth, and sixth grades. Data in this table were taken from 257 subjects chosen from the pupils in three state schools for the deaf.

The most noticeable feature of Table 39 is the inconsistency of development at different age levels. There are eight instances in which the percentage of nouns is smaller than in the preceding grade. For the normal children this occurred in only three instances. In the total number the percentages show a fairly consistent increase, with the largest gains coming at the fifth- and sixth-grade levels. With the hearing subjects the gains at the sixth grade were practically the same as those at the fourth grade, with the smallest increment coming at the fifth grade. This is significant when it is interpreted in light of the fact that the mean difference in the chronological age of the deaf and normal subjects ranged from 34.5 months in Grade III to

25.5 months in Grade VI (Table 7). It indicates that while the usage of abstract sensory nouns is less extensive for the deaf, the development is still in process from two to three years later than the highest age studied for the normal subjects. Succeeding tables will be examined with this age factor in mind.

TABLE 39

PERCENTAGE OF ABSTRACT SENSORY NOUNS USED BY DEAF BOYS AND GIRLS IN GRADES III, IV, V, AND VI IN FOUR COMPOSITION TOPICS

Grade	Topic								Total	
	Old Penny		How To Play		Exciting Experience		Why I Like			
	B	G	B	G	B	G	B	G	B	G
III.....	4.7	4.5	1.8	5.9	4.3	2.4	3.4	5.7	3.6	4.3
IV.....	4.9	4.4	2.6	5.3	3.5	4.1	4.5	5.2	3.9	4.6
V.....	5.7	5.4	5.4	6.6	4.5	3.8	4.7	6.6	4.9	5.3
VI.....	4.3	4.7	8.0	6.2	4.7	5.1	7.1	8.0	5.9	5.7

Let us next examine the status of the non-sensory abstract nouns as shown in Table 40.

TABLE 40

PERCENTAGE OF ABSTRACT NON-SENSORY NOUNS USED BY DEAF BOYS AND GIRLS IN GRADES III, IV, V, AND VI IN FOUR COMPOSITION TOPICS

Grade	Topic								Total	
	Old Penny		How To Play		Exciting Experience		Why I Like			
	B	G	B	G	B	G	B	G	B	G
III.....	2.9	2.3	2.6	2.5	1.9	1.3	3.9	8.4	2.8	3.7
IV.....	1.6	3.4	4.0	2.8	2.0	2.2	7.2	9.1	3.6	4.1
V.....	3.5	2.6	3.6	4.2	2.4	2.5	6.1	8.4	3.8	4.1
VI.....	3.5	2.7	3.8	3.7	2.9	2.4	8.1	7.1	4.6	3.7

More inconsistency is apparent with the non-sensory nouns than was true with the sensory. There are eight instances of a lack of increase from grade to grade, the same as in Table 39,

but there are five instances in which the percentage of non-sensory words found in the sixth grade is less than that in a preceding grade. In three instances the third grade shows the highest percentage. In the total percentage for all themes the boys show a consistent growth, whereas the girls improve only slightly at the early levels and show a decrease after the fifth grade. Up to that point, they excel the boys at each level, and in this respect they follow the pattern shown in Table 39, where they were superior at each level up to the sixth.

By combining the data of Tables 39 and 40 one can obtain a summary of total abstract nouns which should be free from some of the irregularities of the separate tables.

TABLE 41

TOTAL PERCENTAGE OF ABSTRACT SENSORY AND NON-SENSORY NOUNS USED BY DEAF BOYS AND GIRLS IN GRADES III, IV, V, AND VI

Grade	Topic								Total	
	Old Penny		How To Play		Exciting Experience		Why I Like			
	B	G	B	G	B	G	B	G	B	G
III.....	7.6	6.8	4.4	8.4	6.2	3.7	7.3	14.1	6.4	8.0
IV.....	6.5	7.8	6.6	8.1	5.5	6.3	11.7	14.3	7.5	8.7
V.....	9.2	8.0	9.0	10.8	6.9	6.3	10.8	15.0	8.7	9.4
VI.....	7.8	7.4	11.8	9.9	7.6	7.5	15.2	15.1	10.5	9.4

When both types of abstract nouns are considered, three general conclusions seem justifiable. First, there is a lack of any consistent order of development in use of abstract nouns. The number of regressions from grade to grade (seven) is a considerable amount when compared with only one such regression for the normal subjects (Table 23). Second, there is evidence here that, for the girls at least, development in the usage of abstract nouns has probably reached the point of most rapid growth at the sixth-grade level, if not before. In two of the topics the peak was reached at the fourth grade, while in one of the remaining two topics there was a slight increase between the fifth and the sixth. This was reflected in the total column where no increase is found after the fifth grade. With the boys the development is more consistent, there being but one instance in which the

percentage of abstract nouns at the sixth grade is not equal to or greater than that at any preceding level. In the totals for all topics the growth for boys is quite uniform and apparently is still in progress at Grade VI. Third, the general characteristics of growth, with reference to rate and also period of greatest acceleration and decline show a striking contrast with those of the normal subjects shown in Table 24.

A comparison of the deaf with normal pupils.--To present this contrast more clearly, the essential features of Table 24 and Table 41 are presented in the following table.

TABLE 42

A COMPARISON OF TOTAL PERCENTAGE OF ABSTRACT NOUNS USED BY NORMAL BOYS AND GIRLS AND DEAF BOYS AND GIRLS IN GRADES III, IV, V, AND VI WITH PERCENTAGE OF INCREASE AT EACH LEVEL

Grade	Boys				Girls			
	Normal		Deaf		Normal		Deaf	
	Total	% Increase	Total	% Increase	Total	% Increase	Total	% Increase
III.....	8.3	...	6.4	...	9.6	...	8.0	...
IV.....	9.9	19.3	7.5	17.2	10.8	12.4	8.7	8.7
V.....	11.0	11.1	8.7	16.0	12.0	11.1	9.4	8.1
VI.....	12.2	10.9	10.5	20.7	13.5	12.5	9.4	...

Two observations are in order after an analysis of Table 42. First, there is a considerable difference in the percentage of abstract nouns used by the normal and by the hard-of-hearing pupils. This difference is about equally pronounced with the boys and girls. Second, a significant difference appears in the rate of growth at the different levels for the deaf boys and girls as compared with the normal. The normal boys, as mentioned earlier, have their period of most rapid development at the earlier levels and then decline slowly, although still making some growth at the sixth grade. Deaf boys, on the other hand, show a more nearly uniform rate during the early levels, with a more rapid growth at the sixth grade. The per cent of increase shown by deaf boys at Grade VI (20.7) indicates that the use of abstract nouns is much later in getting under way than is true for the normal boy. This

factor of late development holds true both as to school grade, the sixth for the deaf compared with the fourth for the normal; and as to the chronological age, the deaf boys being on the average from twenty-six to thirty-six months older than the normal boys. When one considers then that the sixth-grade deaf boys, for example, who are on the average twenty-six months older than the normal, are making a more rapid growth than at either of the three preceding grade levels, the importance of hearing as a factor in abstract language development is at least suggested. It is, of course, further suggested by the differences in absolute amount of abstract words used.

For the girls, the situation differs. Normal girls make a more steady development than do the boys, but their rate of acceleration is slightly positive at the sixth grade as compared with a negative rate for the boys. With the deaf girls the per cent of increase is smaller at each interval than for the normal girls, but the striking feature of their development is their negative rate of acceleration and the apparent cessation of improvement after the fifth grade. In fact, their per cent of improvement from the third through the sixth is very small when compared with either the deaf boys or the normal groups. Net result of their slow growth rate is that at the sixth grade the deaf boys surpass them in both percentage of improvement and in absolute per cent of abstract nouns used. Thus one might suspect that at the period of final maturity of development in this aspect of language the boys would excel the girls.

Relational Words Used by the Deaf

Prepositions as relational words.--The second important phase of language growth in which a comparison of the normal and deaf may be made is the use of relational words. Table 43 presents the data for one type of these, the prepositions.

Of the twenty possible comparisons to be made between boys and girls in Table 43, the girls excel in eight and the boys in eleven. By this method of comparison of sexes the data for the deaf are almost identical with data for the normal subjects, since Table 25 showed the girls excelling in nine of the twenty comparisons, and the boys in nine. An obvious characteristic of the deaf data is the lack of consistency in growth. In several instances the usage is found at the third-, fourth-, or fifth-grade level.

For the girls, the total column indicates that there is no growth after the third grade. The boys are only fairly consistent, with their most rapid rate of growth in three of the topics coming between the fourth- and fifth-grade level, and with a slight decrease in two topics after the fifth-grade level. Two general conclusions concerning the use of prepositions by the deaf pupils may be drawn from the data. First, there is the early development of prepositions in their language, as shown by the fact that there is very slight increase after the third grade. This differs from the normal subjects in whom the maximum growth appeared to be at the fourth grade. Second, there are no clearly defined sex differences. Reference to Table 25 shows the girls slightly superior at three grades in the total column. A comparison of Tables 25 and 43 shows the normal subjects more highly developed in this form of language at each level except for the third grade, where the deaf excel.

TABLE 43

PERCENTAGE OF PREPOSITIONS USED BY DEAF BOYS AND GIRLS IN GRADES III, IV, V, AND VI IN FOUR COMPOSITION TOPICS

Grade	Topic								Total	
	Old Penny		How To Play		Exciting Experience		Why I Like			
	B	G	B	G	B	G	B	G	B	G
III.....	7.8	8.8	7.6	6.4	6.1	9.0	8.4	9.6	7.4	8.8
IV.....	8.5	9.6	7.5	6.8	7.5	7.6	6.8	7.1	7.5	7.5
V.....	10.2	7.6	8.2	6.1	9.1	3.6	8.5	7.2	9.0	5.7
VI.....	10.1	10.4	7.4	7.1	9.7	9.1	9.2	8.8	9.2	8.8

Two pieces of evidence indicate that prepositions are among the less abstract forms of relational words: the superiority of the deaf at the early age level, and the lack of any large differences between the deaf and normal at any level. Neither of these facts held true for the abstract nouns. Further evidence will show whether they hold for other forms of relational words.

Coordinating conjunctions.--Table 44 gives the data for the coordinating conjunctions.

TABLE 44

PERCENTAGE OF COORDINATING CONJUNCTIONS USED BY DEAF BOYS AND GIRLS IN GRADES III, IV, V, AND VI IN FOUR COMPOSITION TOPICS

Grade	Topic								Total	
	Old Penny		How To Play		Exciting Experience		Why I Like			
	B	G	B	G	B	G	B	G	B	G
III.....	4.2	1.5	6.4	4.2	10.2	4.4	5.9	3.1	7.0	3.3
IV.....	4.2	2.2	5.3	6.7	5.5	4.3	4.1	3.6	4.8	4.2
V.....	3.0	3.4	5.7	4.3	6.2	6.1	5.4	5.6	5.3	5.1
VI.....	3.6	4.0	4.7	4.9	6.1	6.1	6.3	6.2	5.3	5.3

Coordinating conjunctions and prepositions present some interesting contrasts as well as similarities. In the former, the boys apparently have reached their maximum at the third grade. Thereafter there is a decline in the importance of coordinating conjunctions. In the use of prepositions this was a characteristic of the girls rather than of the boys. There is practically the same degree of inconsistency in growth in both types of expression. The boys excel, however, in the total of conjunctions used, whereas the girls show an advantage only at the early levels in the use of prepositions.

When compared with the normal data of Table 26, it is observed that the deaf boys excel the normal at Grade III and are only slightly below the normal at the third- and fourth-grade levels but above at the fifth and sixth grades. Both groups show practically no growth after the third grade. The fact that the deaf boys, particularly, show a decline in growth may be attributed to their higher chronological age which accounts for their more nearly complete maturity at the early grade levels. With the normal boys there was slight evidence of this also in that the highest rate of development was found at the fifth grade rather than the sixth.

Subordinating conjunctions.--The third form of relational words, the subordinating conjunctions, are presented in Table 45.

Subordinating conjunctions show the most consistent growth of any of the relational words thus far. There are comparatively few regressions in the percentages from one grade to the next

higher, although it was noticed in the data for the normal subjects (Table 27) there was not a single regression in any of the topics.

TABLE 45

PERCENTAGE OF SUBORDINATING CONJUNCTIONS USED BY DEAF BOYS AND GIRLS IN GRADES III, IV, V, AND VI IN FOUR COMPOSITION TOPICS

Grade	Topic								Total	
	Old Penny		How To Play		Exciting Experience		Why I Like			
	B	G	B	G	B	G	B	G	B	G
III.....	.8	.3	2.1	2.0	1.1	.8	2.0	2.1	1.5	1.2
IV.....	1.4	.6	2.1	2.9	1.5	1.8	5.5	6.6	2.6	2.9
V.....	1.3	1.1	2.0	2.4	1.8	1.4	3.1	4.1	2.1	2.1
VI.....	2.6	2.7	3.2	3.2	2.6	2.6	4.0	3.9	3.1	2.9

The most obvious contrast between the subordinating conjunctions and the prepositions and coordinating conjunctions is that the development of the latter two appears complete at the third- or fourth-grade level, whereas the subordinating words are still showing a large increase in usage at the sixth-grade level. In fact, the rate of increase for the deaf is much larger at this level than is true for the normal subjects. This fact, together with the advantage in age held by the deaf, would seem to indicate that subordinating conjunctions are a more difficult form of language to acquire, and that auditory experiences are important factors in such development. Sex differences are very slight and favor the boys. Differences among the normal subjects are equally slight but in favor of the girls.

Normal and deaf subjects compared.--A comparison of the sex differences and rates of growth for the normal and deaf subjects is made possible in Table 46.

In total percentages, for both boys and girls the normal subjects excel the deaf by a considerable margin. In the rate of increase the normal subjects make their most rapid growth at the third- and fourth-grade levels with a comparatively small increase, especially for the boys at the upper level. The deaf, on the other hand, aside from an unusually large increase at the third-grade level, show a rapid growth through the different grades, with a large percentage at the sixth grade, to indicate that final

maturity in the use of subordinating conjunctions comes at a considerably later age for the deaf than for the hearing subjects.

TABLE 46

TOTAL PERCENTAGE OF SUBORDINATING CONJUNCTIONS USED BY DEAF AND NORMAL SUBJECTS WITH PERCENTAGE OF INCREASE AT EACH LEVEL

Grade	Boys				Girls			
	Normal		Deaf		Normal		Deaf	
	Total	% Increase	Total	% Increase	Total	% Increase	Total	% Increase
III.....	2.1	...	1.5	...	2.2	...	1.2	...
IV.....	2.6	23.8	2.6	73.3	3.0	36.4	2.9	14.2
V.....	3.3	26.9	2.1	19.2	3.1	3.3	2.1	27.6
VI.....	3.6	9.1	3.1	47.6	3.7	19.4	2.9	38.1

Relative pronouns.--The fourth and final type of relational words to be presented is the relative pronoun. Table 47 shows the total percentage of such words for each grade level.

TABLE 47

PERCENTAGE OF RELATIVE PRONOUNS USED BY DEAF BOYS AND GIRLS IN GRADES III, IV, V, AND VI IN FOUR COMPOSITION TOPICS

Grade	Topic								Total	
	Old Penny		How To Play		Exciting Experience		Why I Like			
	B	G	B	G	B	G	B	G	B	G
III.....	.1	...	.1	.2	.1	...	...	...	.05	.03
IV.....	.1	.1	.3	2.3	.1	...	...	.3	.1	.2
V.....	.1	.1	.4	.4	.3	.2	...	...	.2	.1
VI.....	.3	.3	.3	.2	.1	.1	.1	.1	.2	.2

The most obvious feature of the data in Table 47 is the almost complete absence of relative pronouns in the language of deaf pupils, even at the sixth-grade level where the average chronological age is 14 years, 2 months, or about two years in advance of the hearing subjects. Because of the small number of words used the data are inconsistent for the separate topics.

The total column shows that there is a somewhat gradual development, although the girls show evidence of having reached a plateau in growth at Grade IV and the boys at Grade V.

Relative pronouns in normal and deaf subjects.--While relative pronouns make up the smallest percentage of total words of any of the relational words, they are probably of more significance for complex thinking than the quantity indicates. At any rate it is worth while to compare the quantity and the characteristics of their growth in the normal and the deaf subjects. This is done in the following table.

TABLE 48

TOTAL PERCENTAGE OF RELATIVE PRONOUNS USED BY DEAF AND NORMAL SUBJECTS WITH PERCENTAGE OF INCREASE AT EACH LEVEL

Grade	Boys				Girls			
	Normal		Deaf		Normal		Deaf	
	Total	% Increase	Total	% Increase	Total	% Increase	Total	% Increase
III.....	.4	...	.05	...	.3	...	.03	...
IV.....	.5	25	.1	100	.4	33	.1	233
V.....	.6	20	.2	100	.7	75	.1	...
VI.....	.9	50	.3	50	1.0	43	.2	100

Only two conclusions are justified by the evidence of Table 48. First, the normal use from three to seven times as many relative pronouns as do the deaf, although the total for each is small. Second, both groups reach final maturity in this phase of language development at some age beyond that included in the present study. Judging from the more rapid growth at the upper level one could conclude that the normal subjects are nearer their final development at Grade VI than are the deaf subjects, although the mean difference in chronological age at that level is 25.5 months, or slightly more than two years (Table 7).

Summary of relational words.--Preceding tables have presented separately the percentages for the four forms of relational words. Variations in both rate of growth and absolute amount have been noted. Of more significance, however, than the status in each form of word is the status in all relational words combined. Such a summary is shown in Table 49.

TABLE 49

TOTAL PERCENTAGE OF ALL RELATIONAL WORDS USED BY BOTH DEAF BOYS AND GIRLS IN GRADES III, IV, V, AND VI IN FOUR TOPICS

Grade	Topic								Total	
	Old Penny		How To Play		Exciting Experience		Why I Like			
	B	G	B	G	B	G	B	G	B	G
III.....	12.8	10.6	16.2	12.7	17.4	14.2	16.3	14.9	15.9	13.4
IV.....	14.2	12.5	15.3	18.8	14.6	13.7	16.5	17.6	15.1	15.2
V.....	14.6	12.2	16.3	13.2	17.3	11.0	17.0	17.0	16.5	12.9
VI.....	16.7	17.4	15.6	15.4	18.6	17.9	19.6	19.1	17.8	17.3

By combining the four relational words, many of the irregularities of the preceding tables are removed and some of the general trends suggested in the separate tables are made more prominent. First of the general trends is the rather definite superiority of the boys, who, in fifteen of the twenty comparisons of Table 49, equal or excel the girls. In the total of all topics this superiority is quite pronounced. In regularity of development there is no noticeable difference between the sexes, the boys showing five regressions in growth from grade to grade and the girls six. In the periods of most acceleration, some differences are apparent. The girls show an increase from Grade V to VI in every topic as well as in the total. However, they show a decline between Grades IV and V in every instance. Between Grades IV and V the boys show an increase in every case and, with one exception, an increase from Grade V to VI.

Since the rate of increase and the general characteristics of growth are items of importance for this study, the totals with percentages of increase at each grade level are presented in Table 50, along with similar data for the normal subjects.

As was shown also with the abstract nouns, the normal subjects, with the exception of the third-grade boys, use a larger number of relational words than do the deaf. The amount of growth from third to sixth grade is also considerably larger for the normal. The rates of growth for the boys are similar, both showing a decline at Grade VI, with the deaf apparently not as near maturity as the normal are. Normal girls, on the other hand, are showing a rather constant rate of growth, whereas the

deaf make their most rapid development from Grade V to VI. This late spurt in growth of relational words among deaf girls is in contrast with the development of abstract words, which, in Table 42, were shown to be at their maximum at Grade V. However, when recognition is made of the large decline in the use of relational words from Grade IV to V, the significance of the increase from Grade V to VI is considerably minimized.

TABLE 50

A COMPARISON OF TOTAL PERCENTAGE OF ALL RELATIONAL WORDS USED BY NORMAL BOYS AND GIRLS AND DEAF BOYS AND GIRLS IN GRADES III, IV, V, AND VI WITH PERCENTAGE OF INCREASE AT EACH LEVEL

Grade	Boys				Girls			
	Normal		Deaf		Normal		Deaf	
	Total	% Increase	Total	% Increase	Total	% Increase	Total	% Increase
III.....	14.6	...	15.9	...	14.1	...	13.4	...
IV.....	16.9	15.8	15.1	-5.0	16.2	14.9	15.2	13.4
V.....	19.2	13.6	16.5	9.3	17.9	10.5	12.9	-15.1
VI.....	20.2	5.2	17.8	7.9	20.0	11.7	17.3	34.1

A summary of rates of growth.--In preceding tables an attempt has been made to portray the status of the deaf and compare with that of the normal with reference to two characteristics of abstract and relational words, namely, the absolute amount of each found at the four different levels, and the rate of growth in each. These have been pointed out in the discussion of the separate items in preceding tables. In order to summarize certain comparisons, Table 51 recapitulates the data of Table 42 and Table 50.

Table 51 presents the evidence to justify a restatement of certain conclusions which have been suggested in previous analyses of individual tables. Briefly, these points of comparison may be classified as follows:

(1) Comparisons of absolute percentages of both abstract nouns and relational words.
   (a) Between normal and deaf groups.
   (b) Sex differences within either group.

(2) Comparisons of rates of growth in both abstract nouns and relational words.

(a) Between normal and deaf groups.

(b) Sex differences within either group.

TABLE 51

PERCENTAGE OF RELATIONAL WORDS AND ABSTRACT NOUNS USED AT EACH GRADE LEVEL FROM THIRD TO SIXTH WITH PERCENTAGE OF INCREASE FOR DEAF AND FOR NORMAL BOYS AND GIRLS

Grade and Total	Abstract Nouns				Relational Words			
	Normal		Deaf		Normal		Deaf	
	B	G	B	G	B	G	B	G
Grade III Total.....	8.3	9.6	6.4	8.0	14.6	14.1	15.9	13.4
Per cent increase.....	...	...	...	...	...	...	...	...
Grade IV Total.....	9.9	10.8	7.5	8.7	16.9	16.2	15.1	15.2
Per cent increase.....	19.3	12.4	17.2	8.7	15.8	14.9	- 5.0	13.4
Grade V Total.....	11.0	12.0	8.7	9.4	19.2	17.9	16.5	12.9
Per cent increase.....	11.1	11.1	16.0	8.1	13.6	10.5	9.3	-15.1
Grade VI Total.....	12.2	13.5	10.5	9.4	20.2	20.0	17.8	17.3
Per cent increase.....	10.9	12.5	20.7	...	5.2	11.7	7.9	34.1

In terms of absolute percentages of abstract words, both normal boys and girls excel the deaf at every level, the differences being about equally pronounced at every level. In the relational words, the normal excel at every level except the third, where the deaf boys excel either normal group, but the deaf girls use a smaller percentage than either normal group.

As to sex differences in absolute amounts, the normal girls are superior in the use of abstract words at each level. Deaf girls are superior to the deaf boys at each level up to Grade VI, where the boys forge ahead.

In relational words, the normal boys show superiority at every grade. Deaf boys excel at every level except the fourth, where the girls excel them by one-tenth of one per cent.

In comparing the rates of growth, any general conclusions must necessarily take into account the sex differences since both normal and deaf groups exhibit some such differences. In the abstract nouns, with the normal group, the girls are growing at Grade VI more rapidly than the boys and their rate of growth up to that point is nearly uniform. Boys exhibit a negative acceleration. With relational words among the normal group, much the same situation exists. Boys show an earlier growth and a more nearly complete development at Grade VI than do the girls. In view of the fact that the girls excel in absolute amount of abstract nouns and are only slightly inferior at Grade VI in the amount of relational words, there is reason to believe that their acceleration in the latter at Grade VI might cause them to excel the boys in the use of relational words at final maturity also.

For the deaf, the great inconsistency in rate of growth makes difficult any such conclusions as were made for the normal. In the use of abstract nouns the boys surpass the girls at Grade VI only, but their general rate of increase indicates that at a later age this superiority might be maintained. If so, this marks one distinction between normal and deaf groups. In relational words, any prediction as to final status is difficult to make because of the irregularities in development, the larger percentage of increase for the girls at Grade VI being due to the large regression at the preceding level. In view of their greater total growth during the period studied here, however, one might be justified in assuming that they would eventually surpass the boys. Thus, while both deaf and normal boys exceed the girls in absolute number of relational words used, their final superiority at maturity does not appear to be at all certain. Further data on this point will be presented presently.

Statistical significance of data.--The conclusions just stated have all been based upon total percentage of words of the various types used by all the subjects collectively. The statistical reliability of the differences, both in growth and in absolute amount, which have been pointed out in the discussion, will now be investigated. The four written samples for each subject were combined and the percentages of abstract nouns and of all relational words were computed. The mean and a measure of variability were found at each level for the boys and for the girls in abstract nouns and in relational words.

Abstract nouns.--The mean percentage of all abstract nouns used by both boys and girls at each grade level is shown in Table 52. For the deaf, a total of 257 subjects were used.

TABLE 52

MEAN PERCENTAGE OF ALL ABSTRACT NOUNS USED BY DEAF BOYS AND GIRLS IN GRADES III, IV, V, AND VI

Grade	Boys			Girls		
	N	Mean	P.E.	N	Mean	P.E.
III.....	33	6.78	.22	18	8.0	.46
IV.....	41	7.17	.28	32	8.32	.34
V.....	32	8.76	.29	29	9.52	.25
VI.....	36	10.14	.31	36	9.75	.21

A comparison of the means of Table 52 corroborates the evidence of Table 51 with reference to two significant items: the superiority of the girls at each level save the sixth; and the more rapid development of the boys at the upper levels. This latter point deserves comment for two reasons. First, it presents a contrast with the normal boys whose rate of growth at Grade VI appears to be nearing a rate of zero acceleration; and it is also in contrast with the growth of the deaf girls, who apparently have reached their height at Grade V. Thus there seems to be evidence to justify the previously made assumption that the deaf boys probably excel the deaf girls at final maturity in the use of abstract nouns. The reliability of the sex differences at the different levels will add more weight to this assumption.

Reliability of sex differences in abstract nouns.--Table 53 presents the reliability of the sex differences in abstract nouns.

TABLE 53

SEX DIFFERENCES IN MEAN PERCENTAGE OF ABSTRACT NOUNS USED BY DEAF SUBJECTS IN GRADES III, IV, V, AND VI

Grade	$M_g - M_b$	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$
III.....	1.22	.51	2.4
IV.....	1.15	.44	2.61
V.....	.76	.38	2.0
VI.....	- .39	.37	1.05

There is thus seen to be a difference in favor of the girls at Grade III, which, with the exception of a slight fluctuation at Grade IV, decreases constantly until at Grade VI the girls' mean is less than the boys'. Variability likewise decreases with advance in grade. The net result of these two factors seems to indicate that the girls are nearer to their final development than are the boys and that measurements at succeeding levels would show further superiority for the boys. Table 53 may be interpreted to mean that at Grade III the chances that the girls excel are 95 out of 100, while at Grade VI their chances are 24 out of 100. This crossing of the growth curves for the boys and girls between Grades V and VI is in sharp contrast with the characteristics of growth shown for the normal subjects in Table 32, where the superiority of the girls is constantly increasing toward certainty.

Reliability of grade differences in abstract nouns.--The significance of the differences in the mean percentage at the different grade levels is presented next in Table 54.

TABLE 54

GRADE DIFFERENCES IN MEAN PERCENTAGE OF ABSTRACT NOUNS USED BY DEAF SUBJECTS IN GRADES III, IV, V, AND VI

Grades Compared	Boys			Girls		
	Diff.	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$	Diff.	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$
$M_{iv}-M_{iii}$..	.39	.355	1.1	.32	.57	.56
$M_{v}-M_{iv}$...	1.59	.40	3.97	1.20	.42	2.86
$M_{vi}-M_{v}$....	1.38	.42	3.29	.23	.33	.7
$M_{v}-M_{iii}$..	1.98	.36	5.5	1.52	.52	2.9
$M_{vi}-M_{iv}$...	2.97	.42	7.1	1.43	.40	3.57
$M_{vi}-M_{iii}$..	3.36	.38	8.8	1.75	.50	3.5

Table 54 emphasizes the differences in the growth curve for the boys and girls. For the boys, the grade difference is comparatively slight between the first two grades studied, but is almost a completely reliable difference at the two succeeding intervals. The girls, on the other hand, show a small growth from

Grade III to IV, then a fairly reliable difference at the next interval from IV to V, followed by practically no increase from V to VI. Since the absolute percentage of abstract nouns as well as the mean percentage used by the girls has been shown to exceed the boys at Grades III, IV, and V, this means simply that the development for the girls has apparently passed through an earlier acceleration, and is nearing maturity at the beginning of the period studied here. The boys' growth is shown in process of surpassing the girls' at a rate which indicates final superiority for them in this phase of language usage.

Since the sex differences with the deaf are quite significant, and since the characteristics of growth of the two groups are so completely at variance, there seems little justification for combining the two and presenting the grade differences for both groups combined. The results would simply conceal the essential qualities of each group.

Significance of growth in relational words.--Prepositions, the two forms of conjunctions, and relative pronouns were combined, as was done with the abstract nouns. The totals of the four topics upon which each subject wrote were combined and the percentage of relational words was found by using the total number of words written as the base. The mean percentage was then computed for the boys and girls and for the two groups combined.

Table 55 shows the mean percentage of relational words used by the boys and girls at each grade level.

TABLE 55

MEAN PERCENTAGE OF ALL RELATIONAL WORDS USED BY DEAF BOYS AND GIRLS IN GRADES III, IV, V, AND VI

Grade	Boys			Girls		
	N	Mean	P.E.	N	Mean	P.E.
III.....	33	14.5	.37	18	13.14	.26
IV.....	41	13.58	.33	32	15.13	.375
V.....	32	16.76	.25	29	12.67	.22
VI.....	36	17.84	.25	36	17.28	.23

The same two trends which were apparent in Table 51 are noticeable here also, namely, the superiority of the boys at all levels except the fourth, and the greater total growth between

Grades III and VI for the girls. This latter fact, together with the fact that the girls show a decline at Grade V and the boys a similar decline at Grade IV, makes any valid comparison impossible without a further analysis of the extent of the sex differences at each level. This is shown in the following table.

TABLE 56

SEX DIFFERENCES IN MEAN PERCENTAGE OF RELATIONAL WORDS USED BY DEAF BOYS AND GIRLS IN GRADES III, IV, V, AND VI

Grade	$M_b - M_g$	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$
III.....	1.36	.45	3.02
IV.....	-1.55	.50	- 3.1
V.....	4.09	.33	12.4
VI.....	.56	.34	1.6

An analysis of Tables 55 and 56 shows that the growth curves for deaf boys and girls cross and re-cross between Grades III and VI. From a fairly reliable difference in favor of the boys at Grade III the situation changes to an equally substantial difference in favor of the girls at Grade IV, and back to a difference which is three times as large as necessary to insure reliability, in favor of the boys at Grade V. At Grade VI the difference, while not significant, is fairly large and still in favor of the boys. The writer offers no explanation of the trends found in these two tables. Apparently the girls show an earlier growth followed by a decline, whereas the boys show a later growth preceded by a period of decline. Taken together these facts account for the crossing of the curves of growth. The consistency of both groups in showing these tendencies, as for example in Table 49, where the girls show a decline in all four of the topics between Grades IV and V, indicates that, whatever the cause, the results are reliable.

Grade differences in mean percentage.--Grade differences are intimately related to the sex differences and have been commented upon in the previous discussion. The reliability of the grade differences is shown in the table which follows.

A comparison of Tables 57 and 54 shows that the grade differences in relational words are more pronounced than the

differences in abstract words. They are also more inconsistent. Of the six comparisons between successive grades in Table 57, two show regressions. Four of the differences are more than sufficient to insure reliability, and the remaining two are too large to be attributable to chance. Thus the irregularities of Table 57 coincide with, and are explained by, the irregularities of Table 56. That is, the decreased growth rate of the boys at the fourth grade and of the girls at the fifth grade is the common factor in both tables.

TABLE 57

GRADE DIFFERENCES IN MEAN PERCENTAGES OF RELATIONAL WORDS USED BY DEAF BOYS AND GIRLS IN GRADES III, IV, V, AND VI

Grades Compared	Boys			Girls		
	Diff.	P.E.	Diff./P.E.	Diff.	P.E.	Diff./P.E.
$M_{iv}-M_{iii}$..	- .92	.50	-1.84	1.99	.45	4.4
$M_{v}-M_{iv}$...	3.18	.41	7.8	-2.46	.43	- 5.7
$M_{vi}-M_{v}$....	1.08	.35	3.1	4.61	.32	14.4
$M_{v}-M_{iii}$..	2.26	.45	5.0	- .47	.34	- 1.4
$M_{vi}-M_{iv}$...	4.26	.41	10.4	2.15	.44	4.9
$M_{vi}-M_{iii}$..	3.34	.45	7.4	4.14	.35	11.8

Statistical Comparisons of Deaf and Normal Subjects

Mean percentage of abstract nouns.--Comparisons of the deaf and normal subjects in terms of total percentages of abstract nouns and relational words were made in the first part of this chapter. The mean percentages of the two groups as shown in this and the preceding chapters will now be presented together, and the statistical significance of the differences will be ascertained.

Table 58 presents the data for deaf and normal boys in use of abstract nouns.

Thus we see that the differences in total percentages of abstract nouns, as was shown in Table 51, are in every instance reliable differences, particularly so at the three upper levels. Deaf boys at Grade VI have reached the approximate state of maturity of the normal boys at Grade IV. Thus, in terms of chronological

age, the deaf are considerably retarded since the median age of sixth-grade deaf boys used in this study is 14 years, 3 months, while the median age of the fourth-grade normal boys is 10 years, 2 months, or 4 years, 1 month, of retardation (Table 7).

TABLE 58

DIFFERENCES IN MEAN PERCENTAGE OF ABSTRACT NOUNS USED BY DEAF AND NORMAL BOYS IN GRADES III, IV, V, AND VI

Grade	Normal	Deaf	Diff.	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$
III.....	8.38	6.78	1.6	.42	3.66
IV.....	10.01	7.17	2.84	.44	6.45
V.....	11.2	8.76	2.44	.49	5.0
VI.....	12.1	10.14	1.96	.42	4.7

Furthermore, rate of growth for normal boys seems to have reached its height at Grade V at a median age of 11 years, 7 months, whereas the deaf are still in process of development at Grade VI at a median age 2 years and 7 months in excess of that of the normal at Grade V. While the deaf are thus much later in developing their usage of abstract nouns, their development continues at least four years beyond the time of apparent cessation for the normal, and the evidence of this study gives no indication as to how much further it may develop.

Table 59 gives similar data for the girls, both deaf and normal.

TABLE 59

DIFFERENCES IN MEAN PERCENTAGE OF ABSTRACT NOUNS USED BY DEAF AND NORMAL GIRLS IN GRADES III, IV, V, AND VI

Grade	Normal	Deaf	Diff.	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$
III.....	9.03	8.0	1.03	.66	1.56
IV.....	10.93	8.32	2.61	.49	5.3
V.....	12.1	9.52	2.58	.34	7.6
VI.....	13.2	9.75	3.45	.33	10.45

Differences in use of abstract nouns among deaf and normal girls are similar to those of the boys, save in Grade III,

where the difference is not sufficiently large to be reliable. Otherwise the differences are even more pronounced than among the boys. The deaf girls, for example, at Grade VI have little more than surpassed the normal subjects at Grade III. The difference in median chronological age at these two levels is 4 years, 10 months. There is evidence in Tables 58 and 59 that the deaf girls are somewhat nearer their final status of growth than are the deaf boys, since their rate of development slows up perceptibly at the upper levels.

Mean percentage of relational words.--Table 60 gives the basis for determining the reliability of the difference between the normal and the deaf boys in the percentage of relational words used at each level.

TABLE 60

DIFFERENCES IN MEAN PERCENTAGE OF RELATIONAL WORDS USED BY DEAF AND NORMAL BOYS IN GRADES III, IV, V, AND VI

Grade	Normal	Deaf	Diff.	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$
III.....	14.54	14.50	.04	.63	.06
IV.....	17.07	13.58	3.49	.53	6.6
V.....	19.33	16.76	2.57	.40	6.4
VI.....	20.15	17.84	2.31	.36	6.4

Since the data for the girls show some features in common with that for the boys, Table 61 should be presented with the foregoing table.

TABLE 61

DIFFERENCES IN MEAN PERCENTAGE OF RELATIONAL WORDS USED BY DEAF AND NORMAL GIRLS IN GRADES III, IV, V, AND VI

Grade	Normal	Deaf	Diff.	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$
III.....	14.21	13.14	1.07	.50	2.14
IV.....	16.34	15.13	1.21	.47	2.57
V.....	18.12	12.67	5.45	.38	14.3
VI.....	20.13	17.28	2.85	.325	8.8

Tables 58, 59, 60, and 61 have one feature in common concerning the growth of the normal and deaf in these two phases of language development. That is, the deaf and normal resemble each other more closely at Grade III than at either one of the three succeeding grades, that being the only grade at which there is not a thoroughly reliable difference between the two groups. This means that at the age of 9 years, 4 months, the median age of the normal third-grade subjects, abstract nouns and relational words have reached a stage of development slightly superior to that reached by the deaf subjects at the same school grade, with a median age of 12 years, 3 months. This gap between the two widens with increasing age up to a certain point, indicating a more rapid acceleration on the part of the normal subjects. Evidence in three of the four tables referred to shows this point to be at the fifth grade. There is some evidence that at this point the growth for the normal subjects is approaching either its maximum or at least a plateau, whereas the deaf in most instances are still continuing in their development.

CHAPTER VI

A FURTHER ANALYSIS OF RELATIONAL WORDS

General Objectives

Up to this point this study has attempted to compare two groups, the deaf and the normal, with reference to their usage of abstract nouns and relational words.

We shall now be concerned with an attempt to make further comparisons and differentiations within the field of the relational words alone. The purpose is twofold: first, to determine whether the usage of relational words in the normal flow of written discourse shows the same characteristics of growth as it does in a test situation involving largely the recognition of relationships already expressed; and second, to find which specific type of relational ideas are first to develop and which are most highly developed within the different groups at all levels included in the present study. Considering these purposes separately for a moment, we can see that the first purpose should serve in a way to check the validity of the technique used thus far in measuring the extent of usage of relational words. That is, if a subject uses relational words our assumption is that such usage is an indication of understanding. If this assumption is unwarranted, then the subject will presumably fail to recognize a situation where such a relational word should be used. At least he will fail more frequently than the individual who understands such usage.[1]

The second general objective is concerned with the fact that such relational words as relative pronouns and conjunctions indicate different kinds of relationships, such as Cause, Result, Comparison, and so forth. Therefore the test which was used was so arranged that a part of the questions tested the subject's ability to recognize each of these relationships. Thus some idea was gained as to which kinds of relationships develop first and which are probably most difficult and hence last to develop.

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[1]Jean M. Deutsche, The Development of Children's Concepts of Causal Relations. Minneapolis: University of Minnesota Press, 1937.

Nature of Completion Test Used

Selection of data.--Data used in the completion test were obtained by asking twelve teachers in the Wisconsin School for the Deaf to submit a sample test containing the connectives which they felt were most commonly used at their particular grade level. The writer had two purposes in mind in securing these data from teachers of the deaf. First, since the connectives have to be taught specifically to deaf children, it was felt that by getting a list of words most frequently used in the deaf school, one would have a fair list to submit to hearing children as well. Secondly, in order to use a connective intelligently, the child must understand the vocabulary and also the meaning of the ideas to be connected. No one knows the scope of the deaf child's knowledge as well as the one who teaches deaf children. Therefore the sentences submitted were probably more nearly within the deaf child's comprehension than would have been true if someone else had made them. Even so, the teachers of the deaf in the lower grades particularly were reluctant to use the test because they felt sure their pupils would not be able to react favorably. As the test turned out, it probably was too difficult to measure accurately at the third-grade level, but at any rate it did indicate the stage of development reached at that level.

In all, seven hundred statements were submitted, making use of sixty-five connectives. From these the most frequently used ideas were selected and placed in the first draft of the test. In all, three revisions were made after analyzing the results obtained from preliminary trials. As nearly as possible, all statements were removed which failed to discriminate between successive grade levels. In the final revision a few connectives were left in the test which were not very discriminative on the basis of the percentage of correct responses at different grade levels, but it was the writer's purpose to attempt to find out at what level the ability to use such connectives would come into play. One such example was the double connective "not only--but also," which was not correctly used before the sixth grade and only rarely there.

The facts of history, geography, and common everyday affairs which were to be joined by the connective words of the test were selected from the materials and submitted by the third-grade teachers so that the variable factor of difficulty throughout

the four grades tested was in the connective words themselves and the relationship of the ideas one to the other rather than in the vocabulary or the ideas themselves.

Types of relational ideas.--The sixty-five words are listed on page 27 and in the Appendix, where a copy of the test is found also. These connectives were placed in sentences containing ideas which, if properly related, were designed to express seven different kinds of relationships. The relationships expressed, together with the number of sentences designed to express each were as follows: Cause (5), Comparison (16), Concession (6), Condition (7), Result (6), Time (12), and Relationship (13). Of these seven types, the last named is in reality a miscellaneous division and hence a misnomer since all the types are in a sense expressions of relationship.[1]

Characteristics of Growth in Normal Subjects in Ability To Recognize Need for Relational Words

General pattern for normal subjects.--Our first objective in this part of the study is to determine the general pattern of growth in ability to use relational words to connect and relate ideas which are already expressed. Whether this is the same ability as that involved in the free discourse of the child's own making is debatable. Some comparisons of sex differences and of grade differences will enable us to answer the problem at least partially.

In order to make possible certain comparisons of the data from the completion tests with that from the composition materials discussed in chapter iv, Table 62 is presented on the following page. From this data, observations of the general features of growth, as well as of sex and grade differences are possible.

Before considering the extent or the reliability of the differences noted in Table 62, attention should be directed to the three most obvious features of that table. First, of the twenty-eight possible comparisons of boys and girls to be made from the data, the boys excel the girls in eighteen instances. Because of the wide variability it is doubtful if many of these differences are significant, but this will be determined presently.

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[1]Words classified in the "relational" division were those which could not be placed in any of the other six categories. The following words were so classified: for, that, what, where, which, who, whose.

TABLE 62

MEAN PERCENTAGE OF CORRECT RESPONSES MADE BY NORMAL BOYS AND GIRLS IN GRADES III, IV, V, AND VI ON EACH OF SEVEN DIVISIONS OF COMPLETION TEST

Division and Sex	Grade							
	III		IV		V		VI	
	Mean	P.E.	Mean	P.E.	Mean	P.E.	Mean	P.E.
Cause								
Boys.....	72.5	3.5	83	2.74	77	2.05	86	3.2
Girls....	68.5	3.7	77	2.1	92	.9	83	3.9
Comparison								
Boys.....	37.7	1.76	49.2	1.5	50.3	1.12	53.6	1.8
Girls....	45	1.9	52.6	1.6	61.9	1.98	57.6	1.8
Concession								
Boys.....	48.2	4.4	51.5	3.9	70.5	4.2	72.5	2.8
Girls....	37.9	2.9	54	3.7	51	3.9	65.5	3.7
Condition								
Boys.....	52.4	3.1	57.5	1.7	75	3.8	73.6	2.4
Girls....	49.6	2.4	61.7	2.6	61.3	2.1	69.9	3.0
Relationship								
Boys.....	76.2	2.6	90	1.1	88.7	1.5	92.2	1.4
Girls....	76.5	2.1	85	1.6	84.5	1.6	87	2
Result								
Boys.....	36.1	4.2	42.6	1.9	42.8	3.9	32.9	3.2
Girls....	33	3.7	51.4	2.8	34.5	1.8	30.8	2.1
Time								
Boys.....	66.6	2.3	79.7	1.9	85.2	1.8	87.7	1.5
Girls....	63.5	3.3	84.7	1.8	79.5	2.0	82	2.7

Second, there is a fairly steady increase from grade to grade. For the boys the growth is more consistent than for the girls. This is shown by the fact that there are only four instances out of a possible twenty-eight in which the boys fail to improve with each succeeding grade, whereas the girls exhibit eight regressions, or twice as many as the boys. The significance of these grade differences will also be examined presently.

Third, there is a very apparent difference in the amount of growth which occurs in the seven different types of relational words. Some, for example those denoting cause and relationship, are well developed at Grade III. Others are poorly developed and show little improvement during the four-year period. This is especially true in the case of the words indicating result. The fact that the scores for both girls and boys decrease after the fourth and fifth grades respectively gives reason to doubt the

validity of this section of the test. The total percentages of correct responses for all the subjects on this one section show the same trends, so the results in Table 62 are not due to the variability among the scores. Other divisions, such as Comparison, Concession, Condition, and Time, are immature at Grade III but show a rather steady development, and in most cases are still developing, at Grade VI.

Thus Table 62 has two features in common with the composition data of chapter iv, namely, the slight superiority at all levels for the boys, and the rather consistent general increase in the facility with which relational words are used at successive grade levels.

Since our primary concern is not in the sex differences but rather in the amount of development from grade to grade, our next purpose is to examine the sex differences and determine whether they are sufficiently reliable to justify separate treatment.

Sex differences on completion data.--To show the significance of the sex differences which have been suggested in Table 62 the following tables are presented for the four grades included in the study.

Thus the most nearly reliable sex difference in Grade III is seen to be in favor of the girls, although none of the differences approach reliability closely. The total percentage on all divisions is only very slightly in favor of the boys.

TABLE 63

SEX DIFFERENCES IN MEAN PERCENTAGES OF CORRECT RESPONSES (MADE BY NORMAL BOYS AND GIRLS) IN GRADES III AND IV IN EACH OF SEVEN DIVISIONS OF COMPLETION TEST

Division	Grade III			Grade IV		
	$M_b - M_g$	P.E.	Diff./P.E.	$M_b - M_g$	P.E.	Diff./P.E.
Cause.....	4.0	5.1	.78	6.0	3.4	1.8
Comparison.....	- 7.3	2.6	-2.8	-3.4	2.17	-1.6
Concession.....	10.3	5.2	2.0	-2.5	3.5	- .71
Condition.....	2.8	3.9	.72	-4.2	3.1	-1.35
Relationship....	- .3	3.3	- .09	5.0	1.9	2.6
Result.....	3.1	5.6	.55	-8.8	3.4	-2.6
Time.....	3.1	4.0	.77	-5.0	2.6	-1.9
Total.....	1.75	2.9	.6	- .25	2.5	- .1

Sex differences in Grade IV are inconsistent and lacking in significance in practically every instance. Such differences as do appear are mostly in favor of the girls. An examination of Table 62 shows that the girls make their most rapid improvement between Grades III and IV, whereas the boys in some of the divisions make their greatest gain at a later level. The result is a slight superiority for the girls at Grade IV.

Table 64 reveals that the fifth grade has more significant sex differences than either the fourth or the third grade, although the two largest differences are in favor of the girls. It is interesting to note that in the division of Comparison the girls show superiority at every grade level. This is the only group of words in which they show consistent superiority over the boys.

TABLE 64

SEX DIFFERENCES IN MEAN PERCENTAGE OF CORRECT RESPONSES (MADE BY NORMAL BOYS AND GIRLS) IN GRADES V AND VI IN EACH OF SEVEN DIVISIONS OF COMPLETION TEST

Division	Grade V			Grade VI		
	$M_b - M_g$	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$	$M_b - M_g$	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$
Cause.....	-15.0	2.24	-6.7	3.0	5.0	.6
Comparison.....	-11.6	2.27	-5.1	-4.0	2.5	-1.6
Concession.....	19.5	5.7	3.4	7.0	4.6	1.5
Condition.....	13.7	4.3	3.2	3.7	3.8	.9
Relationship....	4.2	2.2	1.9	5.2	2.4	2.2
Result.....	8.3	4.3	1.9	2.1	3.8	.6
Time.....	5.7	2.7	2.1	5.7	3.1	1.8
Total.....	7.5	2.8	2.7	3.0	2.3	1.3

Summarizing the data of the preceding tables we find ten differences in favor of the girls, two of which are large enough to be reliable. The remaining eighteen differences are in favor of the boys, with none large enough to be completely reliable. All in all the sex differences found here do not appear sufficiently strong to justify a separate treatment of the two groups for further comparisons. Probably the most significant feature of the data lies in the fact that it is fairly consistent with

the composition data of chapter iv in that it shows a rather consistent though not large difference in favor of the boys at three of the four grade levels.

Grade differences in completion data.--Inasmuch as the sex differences are divided, and such as do exist are significant in only two instances, the general pattern of development from grade to grade in each of the separate divisions can be examined best by considering the two groups together.

Table 65 presents the grade differences for four of the divisions of the completion test.

TABLE 65

GRADE DIFFERENCES IN MEAN PERCENTAGE OF CORRECT RESPONSES (MADE BY NORMAL BOYS AND GIRLS) ON FOUR DIVISIONS OF THE COMPLETION TEST

Division and Grades	Diff.	P.E.	Diff./P.E.
Cause			
$M_{iv}-M_{iii}$.....	9.9	2.0	4.95
$M_{v}-M_{iv}$.....	1.7	2.0	.85
$M_{vi}-M_{v}$.....	2.8	2.1	1.3
Comparison			
$M_{iv}-M_{iii}$.....	9.5	1.7	5.6
$M_{v}-M_{iv}$.....	5.4	1.8	3.0
$M_{vi}-M_{v}$.....	- .8	2.0	- .4
Concession			
$M_{iv}-M_{iii}$.....	10.1	3.7	2.7
$M_{v}-M_{iv}$.....	6.5	4.3	1.5
$M_{vi}-M_{v}$.....	10.7	4.2	2.6
Condition			
$M_{iv}-M_{iii}$.....	7.4	2.8	2.6
$M_{v}-M_{iv}$.....	9.4	2.3	4.1
$M_{vi}-M_{v}$.....	2.5	2.9	.86

The most pronounced grade differences are between the third and fourth grades in three of the four divisions of Table 65, with one division showing the greatest increase from Grade IV to V. Observation of Table 62 will show that, for both boys and girls, the largest increase occurs between the first two grades. This fact corresponds with the results on the composition data as shown in chapter iv, Table 38. While the differences in Table 65 are in most cases not statistically reliable, they are in most instances too large to be due to chance, and in only one interval is there a regression between successive grades.

Similar data for the remaining three divisions of the completion test are presented in Table 66.

TABLE 66

GRADE DIFFERENCES IN MEAN PERCENTAGE OF CORRECT RESPONSES (MADE BY NORMAL BOYS AND GIRLS) ON THREE DIVISIONS OF THE COMPLETION TEST

Division and Grades	Diff.	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$
Relationship			
$M_{iv}-M_{iii}$.....	11.2	1.97	5.7
$M_{v}-M_{iv}$.....	- 1.0	1.9	- .53
$M_{vi}-M_{v}$.....	3.1	2.1	1.5
Result			
$M_{iv}-M_{iii}$.....	12.1	3.3	3.7
$M_{v}-M_{iv}$.....	- 8.4	2.3	-3.6
$M_{vi}-M_{v}$.....	- 6.8	2.6	-2.6
Time			
$M_{iv}-M_{iii}$.....	17.9	2.37	7.4
$M_{v}-M_{iv}$.....	.5	2.1	.24
$M_{vi}-M_{v}$.....	2.1	2.24	.94

As in Table 65, the only completely reliable differences in Table 66 are found to exist between the third- and fourth-grade levels. The regressions in the Result division were mentioned previously as one indication that the test possibly was of doubtful validity as a measure of ability in that phase of language. Why scores should decrease so noticeably after the fourth grade is difficult to understand, yet this was true for both boys and girls. Tables 65 and 66 show the grade differences in each of the seven parts of the completion test. The relational words analyzed in the composition data of chapter iv were, however, not classified into types. In order to compare the rates of growth as reflected in the two types of data, it would seem logical, therefore, to consider the total response on the test rather than the responses on the individual parts.

Table 67 presents the grade differences in the mean of the correct total response on the test, for boys and girls separately.

A comparison of the two columns in Table 67 which show the ratio of the difference to the probable error of the difference indicates that if one were to combine the data for both boys and girls some features of growth peculiar to each group would be

concealed thereby. There is one feature in common with the two preceding tables: the one significant increase between successive grades is found between the third and fourth. This was true for five of the seven divisions presented in Tables 65 and 66. For both boys and girls the increments between successive grades decrease in amount at the higher levels, with the boys apparently much nearer their limit of improvement at Grade VI than are the girls.

TABLE 67

GRADE DIFFERENCES IN MEAN PERCENTAGE OF CORRECT TOTAL RESPONSES (OF NORMAL SUBJECTS) ON ALL DIVISIONS OF COMPLETION TEST FOR BOYS AND GIRLS SEPARATELY

Grades Compared	Boys			Girls		
	Diff.	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$	Diff.	P.E.	$\frac{\text{Diff.}}{\text{P.E.}}$
$M_{iv}-M_{iii}$..	11.25	2.27	4.9	12.75	1.89	6.7
$M_{v}-M_{iv}$...	5.75	2.83	2.0	- 1.5	1.98	- .76
$M_{vi}-M_{v}$....	.5	2.78	.2	5.0	1.94	2.6
$M_{v}-M_{iii}$..	17.0	2.94	5.8	11.25	2.03	5.5
$M_{vi}-M_{iv}$...	6.25	2.05	3.0	3.5	1.79	2.0
$M_{vi}-M_{iii}$..	17.5	2.2	8.0	16.25	1.84	8.8

Summary of completion data for normal subjects.--Reviewing the features of the tables presented thus far in the present chapter, there is evidence to support two general conclusions concerning the characteristics of growth in ability to use relational words to connect ideas already expressed. These characteristics relate to the sex differences and the grade differences. As to the former we can conclude that the sex differences are of the same order as those found in the composition data, that is, the boys show a slight superiority at each grade level except the fourth in most of the divisions of relational words tested. This difference, while consistent, is not significant. In the composition data of chapter iv the same condition prevailed. Thus in this respect the two sets of data tend to corroborate each other.

The grade differences are of the same general order as those for the composition data, in one respect--they show an increase between successive grades except for the girls at Grade V.

They differ, however, in that they are not as pronounced as the differences shown for the composition data. In chapter iv, Table 37, the evidence showed the greatest absolute improvement in growth for the boys between Grades III and IV and the least amount from Grades V to VI. Table 67 exhibits the same trends, with growth apparently much nearer completion at Grade VI than was true for the composition data. Table 37 also showed the girls making their largest absolute gain between Grades III and IV, followed by a slight decline in improvement, with a larger increase from V to VI. The completion data of Table 67 shows the same tendencies, the chief difference being that the decline in improvement from Grades IV to V is so large as actually to constitute a regression. The girls show a larger improvement from Grade V to VI than do the boys, in both the completion data of Table 67 and the composition data of Table 37.

The same general tendencies, therefore, seem to be present in both types of data, although much less marked in the completion data. The much greater variability among the percentage scores on the completion data helps account for a part of the inconsistency in sex and grade differences.

General Pattern for Deaf Subjects

Having analyzed the results of the completion test with the normal subjects, similar analyses will now be presented for the deaf subjects. For this part of the study, the same subjects were used as were used for the collection of the composition data. In all, then, 257 subjects were tested and the results compiled.

These results will be compared with the results for the normal subjects on the same test and also with the normal and deaf subjects on the composition data. The chief concern here, as with the normal subjects, is in determining the characteristics of development and in making comparisons with the development as reflected in the composition data. These can be examined best by making an analysis of the sex differences and grade differences.

Sex differences among deaf subjects.--Table 68 shows the extent and reliability of the sex differences at the third- and fourth-grade levels in each of the seven divisions of the completion data, together with the difference in the total percentage on the entire test.

TABLE 68

SEX DIFFERENCES IN MEAN PERCENTAGES OF CORRECT RESPONSES BY DEAF SUBJECTS OF GRADES III AND IV IN EACH OF SEVEN DIVISIONS OF COMPLETION TEST

Division	Grade III			Grade IV		
	$M_b - M_g$	P.E.	Diff. / P.E.	$M_b - M_g$	P.E.	Diff. / P.E.
Cause.....	1.3	1.31	1.0	-13.8	3.6	-3.8
Comparison.....	- .78	1.13	- .69	- 3.3	1.47	-2.2
Concession.....	1.3	2.42	.54	- 6.2	5.3	-1.2
Condition.....	6.6	2.32	2.8	- 6.3	2.1	-3.0
Relationship....	5.1	3.11	1.6	- 3.1	5.8	- .54
Result.....	8.3	1.39	6.0	.16	2.0	.1
Time.....	-2.4	2.71	- .89	- 8.3	3.7	-2.2
Total.....	3.9	1.36	2.9	- 8.0	2.5	-3.2

In Grade III, only one group shows a significant sex difference, and that for the group of Result words, on which the least consistent results of the entire test were obtained. Six of the differences favor the boys, and in the mean total responses on the entire test the boys show a substantial superiority over the girls.

Between Grades III and IV the growth curves for boys and girls apparently cross each other, for in Grade IV the girls excel in every division except one. Their superiority in the total score is more marked than was true for the boys in the preceding grade.

The point of significance in Table 68 is that the same crossing of growth curves was found to exist in the composition data of chapter v. The deaf girls excelled the boys in the mean percentage of relational words used in written discourse at the fourth-grade level, whereas the boys excelled at Grade III.

Similar sex comparisons for Grades V and VI are shown in Table 69.

Grade V shows practically the same superiority for the girls as was shown in Grade IV of Table 68, with some of the differences approaching complete reliability. At the sixth grade, however, the boys are again forging ahead, and in the total mean percentage on the entire test they excel the girls again. None of the differences at this level are reliable, however.

TABLE 69

SEX DIFFERENCES IN MEAN PERCENTAGES OF CORRECT RESPONSES BY DEAF SUBJECTS OF GRADES V AND VI IN EACH OF SEVEN DIVISIONS OF COMPLETION TEST

Division	Grade V			Grade VI		
	$M_b - M_g$	P.E.	Diff. / P.E.	$M_b - M_g$	P.E.	Diff. / P.E.
Cause.....	-12.7	3.2	...	-3.4	3.9	- .87
Comparison.....	- 3.9	1.2	...	1.0	1.8	.55
Concession.....	- 5.4	3.2	...	-2.7	3.1	- .87
Condition.....	2.8	2.0	...	2.4	2.8	.85
Relationship....	-18.2	3.8	...	.2	3.3	.06
Result.....	- 1.5	1.8	...	-6.7	2.9	-2.3
Time.....	- 6.6	3.3	-2.0	1.7	3.5	- .46
Total.....	-14.0	3.1	-4.5	2.1	2.8	.75

In the composition data of chapter v, the deaf boys excelled at Grades III, V, and were slightly ahead at Grade VI. In the completion data the curves cross at Grade IV also, but do not re-cross again until the sixth grade. Thus the differences, while not as significant in the latter case, are of a similar nature in the two sets of data.

Grade differences in completion data.--Sex differences among deaf subjects are shown in Tables 68 and 69 to be inconsistent and in many cases too small to be of importance. However, in some divisions of the test there are significant differences which would not justify grouping the data together in order to note the grade differences.

Table 70, therefore, presents the grade differences in mean percentage of responses for the boys and girls separately.

Grade differences among the boys.--Of the twenty-one comparisons between grade intervals made for the boys in Table 70, nine show a ratio of at least 3.0 between the difference and the probable error of that difference. This approaches reliability rather closely. Of these nine instances of growth, seven occur between the fifth and sixth grades. In none of the seven divisions of the test is there a significant growth increase from Grade III to IV, and in only two instances from Grade IV to V. This is a marked contrast with the situation shown in Tables 65, 66, and 67

TABLE 70

GRADE DIFFERENCES IN MEAN PERCENTAGE OF CORRECT RESPONSES (MADE BY DEAF SUBJECTS) ON SEPARATE DIVISIONS OF THE COMPLETION TEST

Division and Grades	Boys			Girls		
	Diff.	P.E.	Diff. / P.E.	Diff.	P.E.	Diff. / P.E.
Cause						
M_{iv}-M_{iii}.....	3.2	2.3	1.4	18.3	3.1	5.9
M_{v} -M_{iv}.....	5.1	2.6	2.0	4.0	4.1	1.0
M_{vi}-M_{v}.....	12.5	3.7	3.4	3.2	3.4	.9
Comparison						
M_{iv}-M_{iii}.....	- .64	.88	- .7	1.8	1.6	1.1
M_{v} -M_{iv}.....	.9	.12	7.5	1.5	1.5	1.0
M_{vi}-M_{v}.....	7.4	1.57	4.7	2.5	1.4	1.8
Concession						
M_{iv}-M_{iii}.....	.6	5.1	.1	8.0	2.7	3.0
M_{v} -M_{iv}.....	10.2	5.3	1.9	9.4	3.1	3.0
M_{vi}-M_{v}.....	10.2	3.2	3.2	7.5	3.1	2.4
Condition						
M_{iv}-M_{iii}.....	1.5	2.1	.7	14.4	2.3	6.2
M_{v} -M_{iv}.....	3.7	2.0	1.8	- 5.4	2.3	-2.3
M_{vi}-M_{v}.....	9.7	2.5	3.9	10.0	2.6	3.8
Relationship						
M_{iv}-M_{iii}.....	.7	3.1	.2	8.9	4.8	4.8
M_{v} -M_{iv}.....	- .1	3.1	- .03	14.9	6.1	2.4
M_{vi}-M_{v}.....	33.5	3.2	10.5	15.2	3.8	4.0
Result						
M_{iv}-M_{iii}.....	.8	1.8	.4	8.9	1.6	5.6
M_{v} -M_{iv}.....	- 5.2	1.7	- 3.0	- 3.5	2.1	-1.7
M_{vi}-M_{v}.....	6.6	2.1	3.1	11.8	2.7	4.3
Time						
M_{iv}-M_{iii}.....	2.3	2.9	.8	8.2	3.6	2.3
M_{v} -M_{iv}.....	5.3	2.7	2.0	3.6	4.1	.9
M_{vi}-M_{v}.....	20.4	3.2	6.4	12.1	3.7	3.3

for the normal subjects, in which the only significant increases were found to be between Grades III and IV. In commenting on those tables on page 78, the statement is made that "for both boys and girls the increments between successive grades decrease in amount at the higher levels, with the boys apparently much nearer their limit of improvement at Grade VI than are the girls." Obviously for the deaf boys at least this situation is reversed and growth apparently is getting under way vigorously at the sixth-grade point. This fact of a late growth for the boys in relational word usage as measured by the test is in keeping with the evidence

on the composition data also, where it was shown, in Table 57, that there was an actual regression in development between Grades III and IV, followed by increases during the following two intervals. Growth in composition ability, however, does seem to be slowing up whereas the recognition ability reflected in the tests apparently is increasing more rapidly between successive grade intervals.

Grade differences among the girls.--Turning to the problem of growth for the girls, we find that in ten of the twenty-one grade interval comparisons they show a difference which is at least three times the probable error. Six of these are more than four times as large as the probable error. However, the pattern of growth rate for the girls differs from that of the boys. In fact, in four of the seven divisions the girls make their most rapid growth between Grades III and IV. The period of least growth is at the fifth-grade level, a fact which was pointed out also in connection with the composition data of chapter v.[1]

Since we are concerned here with the similarity of pattern of growth reflected in the composition and completion data, it will be advantageous to consider the latter as a unit rather than in seven divisions separately. Such a summary of data will enable one to make further comparisons.

Table 71 shows the grade differences in mean percentage of the total responses on the entire completion test, rather than on the separate divisions.

TABLE 71

GRADE DIFFERENCES IN MEAN PERCENTAGE OF CORRECT TOTAL RESPONSES BY DEAF SUBJECTS ON ALL DIVISIONS OF COMPLETION TEST COMBINED

Grades Compared	Boys			Girls		
	Diff.	P.E.	Diff./P.E.	Diff.	P.E.	Diff./P.E.
$M_{iv}-M_{iii}$..	1.15	2.01	.57	13.1	2.1	6.2
$M_{v}-M_{iv}$...	4.9	2.5	2.0	10.9	3.1	3.5
$M_{vi}-M_{v}$....	34.3	2.8	12.3	18.2	3.2	5.7
$M_{v}-M_{iii}$..	6.1	2.4	2.5	24.0	2.5	8.6
$M_{vi}-M_{iv}$...	39.2	2.5	15.7	29.1	2.9	10.0
$M_{vi}-M_{iii}$..	40.4	2.3	17.6	42.2	2.2	19.2

[1]Cf. page 66.

At a glance we can verify the statements made following Table 70 concerning the late development of the boys and their lack of growth at the early levels.

Returning to the girls' data, one observes more vividly the distinction in pattern of growth of boys and girls. Their growth from Grades III to IV is their largest, but is only slightly in excess of that from V to VI, with the least amount of development at Grade V. This coincides exactly with the shape of curve shown on the composition data of Table 57.[1] Unlike the boys, the girls' data of Table 57 also shows the general features of growth changes exhibited by the normal girls on the same data (Table 67).

Thus for both the deaf boys and the girls there is a general agreement in the characteristics of growth exhibited in the two types of data presented as evidence of the subject's ability to handle relational words. The increments vary in extent at certain places but as a whole the growth curves produced in both show similar general features.

Summary of completion data for deaf subjects.--Data for the deaf subjects presented in the preceding tables of this chapter have shown certain features of growth which have been concerned with sex differences and with grade differences. There is evidence to justify one in concluding that the sex differences are less pronounced in the completion data than in the composition data, although they are similar in that the growth curves in each case cross between the third and the fourth grade and re-cross again before the sixth grade. The two bits of evidence are identical in a second respect in that the boys make their smallest growth between Grades III and IV and girls between Grades IV and V in both the composition and completion data.

In the grade differences there is a continuous growth in the completion data from grade to grade, whereas in the composition data the boys make a regression between Grades III and IV and the girls regress between Grades IV and V. These are the two periods of smallest gain in the completion data, however, so the two sets of evidence do show similar trends.

Thus it appears that the first and main objective of the use of the completion data has been attained. That is, it appears that there are characteristics of growth which by comparison in

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[1] Cf. page 66.

terms of both sex and grade seem to be similar in the two forms of data. For example, the general superiority of one sex at certain levels and the characteristic large or small increments between certain levels bear striking resemblances of general contour despite specific minor variations. This fact in turn seems to validate partially at least the general assumption underlying the use of composition data in the first part of the study, namely, that the extent of usage of relational words is an index of the subject's understanding of such words. Otherwise this extent of usage would bear no necessary relationship to the ability to recognize the need for relational words such as were involved in the completion test.

Differences in development in different forms of relational words among deaf and normal subjects.--A second objective of the use of the completion test was to detect differences in development of the different general classes of relational words. For the normal subjects these were pointed out in Table 62. Similar data for the deaf are presented in Table 72, along with a recapitulation of Table 62. All mean scores are given correct to the nearest integer.

Differences in the absolute percentages of correct responses by deaf and normal subjects will be shown in a following table. The purpose of presenting Table 72 at this point is to indicate the differences in the extent and characteristics of growth in the different types of relational words. By placing the mean scores of both normal and deaf in the same table, some comparisons can also be made.

Observations which seem pertinent to the present study are the following:

1. A rapid growth among the normal subjects in all types of words during the first two grade levels. At the fifth-grade level the maximum growth seems to be attained.
2. Among the deaf there is a slow growth up to the fifth-grade level, followed by a rapid increase. This indicates a much later period of development for the deaf than for the normal.
3. The percentage of increase is larger in every instance for the deaf than for the normal, a fact which has little statistical significance since the absolute

TABLE 72

MEAN PERCENTAGE OF CORRECT RESPONSES MADE BY DEAF BOYS AND GIRLS IN GRADES III, IV, V, AND VI ON EACH OF SEVEN DIVISIONS OF COMPLETION TEST

Division and Sex	Grade							
	III		IV		V		VI	
	Normal	Deaf	Normal	Deaf	Normal	Deaf	Normal	Deaf
Cause								
Boys.....	72	11	83	14	77	19	86	32
Girls.....	68	9	77	28	92	32	83	35
Comparison								
Boys.....	37	7	49	6	50	7	54	14
Girls.....	45	8	53	9	62	11	58	13
Concession								
Boys.....	48	17	51	18	70	28	72	38
Girls.....	38	16	54	24	51	33	65	41
Condition								
Boys.....	52	21	57	22	75	26	74	35
Girls.....	50	14	62	28	61	23	70	33
Relationship								
Boys.....	76	17	90	17	89	17	92	50
Girls.....	76	11	85	20	84	35	87	50
Result								
Boys.....	36	17	43	18	43	13	33	19
Girls.....	33	9	51	18	34	14	31	26
Time								
Boys.....	67	15	80	17	85	22	88	43
Girls.....	63	17	85	25	79	29	82	41
Total								
Boys.....	55	11	66	12	72	17	72	51
Girls.....	53	7	66	20	64	31	69	49

scores for the deaf are so much lower than those for the normal.

4. Relational words indicating Comparisons of ideas and those indicating Result are the two most difficult types, judging from the responses in Grade III and from the amount of growth shown through Grade VI.
5. Judged by the criteria of initial scores and total improvement throughout the period studied, those words measuring Cause, Relationship, and Time are the easiest for normal subjects to master. For the deaf, also, Condition, Relationship, and Time show most growth, although some others show the presence of more ability at the third-grade level.

6. There is a much more consistent growth from grade to grade among the deaf. Of the forty-two possible steps of growth among boys and girls in the seven divisions, the deaf show only four regressions between successive grades. For the normal subjects, there are thirteen instances of a decreasing percentage between successive grades. Since the total percentages for the normal are much higher, this might be taken as an indication of a more nearly complete development among that group in whatever ability is measured by the completion test.

Comparison of Deaf and Normal Subjects on Completion Data

Thus far we have compared the general characteristics of growth, such as the rate and time of growth for the normal and deaf on the completion data, but have made no comparisons of the absolute abilities of the two groups as reflected in the test results.

In order to make such a comparison for each of the seven forms of relational words, Table 73 is given below.

TABLE 73

A COMPARISON OF THE MEAN PERCENTAGE OF CORRECT RESPONSES MADE BY DEAF SUBJECTS AND NORMAL SUBJECTS IN GRADES III, IV, V, AND VI ON EACH OF SEVEN DIVISIONS OF COMPLETION TEST

Division	Grade							
	III		IV		V		VI	
	M_N-M_D	P.E.	M_N-M_D	P.E.	M_N-M_D	P.E.	M_N-M_D	P.E.
Cause.....	59.6	1.5*	59.6	2.4	58.2	2.0	46.5	2.6
Comparison...	35.0	1.5	43.3	1.2	47.4	1.6	41.6	1.6
Concession...	25.3	2.8	32.5	2.8	28.4	3.8	30.2	2.9
Condition....	33.9	2.4	33.4	2.1	44.1	1.8	36.9	2.7
Relationship.	60.1	2.3	61.6	2.3	60.8	2.2	42.7	2.2
Result.....	20.5	2.8	28.7	1.7	24.8	1.8	10.7	2.3
Time.....	49.8	2.7	60.0	2.2	57.4	2.2	40.0	2.4
Total.....	45.2	1.6	50.5	1.9	44.5	2.3	21.7	1.8

*All differences more than four times the probable error.

Grouping of the data for the boys and girls together in one table does not conceal any important factors here in view of the fact that in no division do either the deaf boys or deaf girls excel either the normal boys or the normal girls. In addition, the sex differences in preceding tables have been shown to be of negligible importance in most instances.

By inspection, two conclusions are at once obvious: first, the tremendous superiority of the normal subjects at all levels, and second, the decrease in the difference at the sixth-grade level. The last named fact is most obvious in the total for all the divisions, although it is true also in four of the seven divisions. In six of the seven divisions the deaf show a relative gain on the normal subjects between Grades V and VI. Thus we have evidence in Table 73 (which is clearly evident from Table 62 also) that the normal subjects are approaching a plateau if not their maximum growth around the fifth-grade level whereas the deaf are continuing their development after a much more delayed beginning. The net result is a decrease in difference of mean scores at the upper level. In commenting upon the comparison of deaf and normal in the use of relational words in composition data, the statement was made that "there is evidence that at this point (the fifth grade) the growth for the normal subjects is approaching either its maximum or at least a plateau, whereas the deaf in most instances are still continuing in their development."[1] Here again we have evidence of a similarity of growth among both normal and deaf subjects in the two types of data.

A third conclusion, not based upon Table 73 alone, is that the deaf, when compared with the normal, exhibit more inferiority in their use of relational words in a test situation than they show in the use of such words in normal written discourse. A comparison of Table 73 with the comparison made in Tables 60 and 61[2] verifies this conclusion. Whether this greater inferiority is due to the fact that the deaf react less aptly in a test situation, whether a different type of ability is involved, or whether the deaf use more relational words whose meanings are not as clearly understood, is difficult to say. Evidence will be presented presently which suggests that the last named possibility may be a partial explanation.

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[1] Cf. page 69.

[2] Cf. page 68.

CHAPTER VII

SUPPLEMENTARY DATA AND COMPARISONS

Objectives attained.--As stated in the opening chapter, the primary objectives of this study were to trace the development of certain abstract language forms in normal and deaf children and to make comparisons of this development during a period of approximately four years. This we have attempted in preceding chapters.

In the process of analysis of the language expression of the subjects in the study, however, a record was made of other factors in expression than those which have been used as the basis of the study. This was done for two reasons. First, there was the feeling that perhaps the separate parts of the language process might serve to re-enforce each other in a way. That is to say, a knowledge of abstract nouns, for example, might be made more meaningful if supplemented with a knowledge of other parts of speech. Second, a record of certain types of errors such as those made in the use of conjunctions and prepositions was assumed to be a useful method for verifying the two techniques used in the study to compare the deaf and normal groups in growth in relational word usage and understanding. The record of errors proved disappointing. They were too few in number to make any valid comparisons possible. However, they do help to maintain certain conclusions previously made from the data.

Abstract Nouns and Relational Words as Differentiating Factors

In chapters iv, v, and vi various comparisons were made of the deaf and normal subjects in their use of abstract nouns and relational words. The general outcome has shown a superiority for the normal subjects, despite the advantage in age held by the deaf. This being true, one might inquire as to how the other aspects of expression differ in the two groups. In other words, is superiority of the normal subjects in abstract nouns and relational words the chief differentiating factor between the two groups?

The answer may be obtained by examining the data for both groups with reference to the total per cent of their written expression which falls into the other chief parts of speech which have not been considered thus far in the study. These are presented in Table 74 for normal and deaf boys and girls.

TABLE 74

A COMPARISON OF NORMAL AND DEAF BOYS AND GIRLS AT EACH GRADE LEVEL IN THE TOTAL PER CENT OF DIFFERENT PARTS OF SPEECH USED IN WRITTEN EXPRESSION

Part of Speech and Sex of Subject	Grade							
	III		IV		V		VI	
	Normal	Deaf	Normal	Deaf	Normal	Deaf	Normal	Deaf
Concrete nouns								
Boys.....	17.0	16.8	13.0	14.7	11.6	16.3	10.1	14.4
Girls.....	12.8	19.3	11.6	15.6	10.2	15.7	7.7	13.9
Personal pronouns								
Boys.....	13.1	15.5	12.4	17.3	11.5	13.4	10.9	12.2
Girls.....	14.1	15.0	12.5	14.6	12.3	15.3	11.1	12.3
Verbs								
Boys.....	21.0	20.5	17.6	19.2	17.8	18.0	16.2	17.2
Girls.....	20.7	17.7	18.7	18.3	18.4	18.6	17.0	16.7
Adjectives								
Boys.....	16.3	17.9	18.0	17.9	21.1	19.8	21.2	20.6
Girls.....	17.4	18.9	17.5	18.8	19.1	21.0	20.7	21.5
Adverbs								
Boys.....	6.9	4.7	10.2	5.8	6.3	5.4	7.9	5.4
Girls.....	9.1	5.1	9.5	6.1	8.4	5.5	8.5	6.9

Table 74 represents the total per cent of each of the five parts of speech used on the four samples of written expression. Twenty comparisons are involved for each sex; of these, the normal boys excel in nine and the deaf in eleven. The normal girls excel in seven and the deaf in thirteen. The deaf boys use more concrete nouns, more personal pronouns, and more verbs. The normal boys use more qualifying words, adjectives and adverbs. These increase with advancing grades. Both the deaf boys and girls excel considerably in personal pronouns, which point is interesting in view of the fact that the analysis showed a majority of the personal pronouns used are in first person. These tend to decrease with each successive grade.

The per cent of verbs fluctuates as would be expected, while the number of concrete nouns decreases perceptibly with the normal and less so with the deaf with the advance in grade, due to the increased use of abstract nouns at the higher levels.

With the girls, the per cent of adjectives is nearly identical for the two groups, with the deaf using slightly more than the normal, but in the adverbs the normal excel considerably.

The real points of distinction then seem to be the smaller part played by the concrete nouns in the language of normal children, with a steady decrease toward the upper age levels; the larger part played by personal pronouns, especially of the first person, in the deaf language, with likewise a decrease at the upper levels; and a larger per cent of qualifying words, adjectives and particularly adverbs, in the language of normal children.

The large part played by personal pronouns of the first person in the expression of the deaf is an indication of egocentrism, which is again interesting in view of the greater chronological age of that group.

Of these language differences it would seem that the differences in concrete nouns are to be expected in view of the differences in abstract nouns previously pointed out. The differences in personal pronouns are probably one indication of mental and social immaturity. At any rate they are consistent differences. Differences in verbs probably have no significance, and are not consistent. The use of qualifying words is probably a significant difference and an indication of greater discrimination in expression. Because of the quantity of expression analyzed, all of these are probably fairly reliable comparisons. There is no contention that they are related to our main problem, except as pointed out in connection with the decrease in use of concrete nouns, which apparently accompanies the increased use of abstract nouns.

Use of Comparisons as Evidence of Language Development

In the preceding chapter it was observed that relational words involving Comparison were among the most difficult for both the deaf and normal to use correctly.[1] The making of comparisons has been recognized as a higher order of thinking than the use of

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[1]Cf. page 86.

simple assertions involving but one idea. In the beginning of the study, therefore, it was decided to keep a record of all comparisons actually made by the subjects in their written discourse. Implied comparisons were not counted. Only those statements which actually involved a statement of comparison of two or more objects or ideas were considered as comparisons.

Such statements as the following were included: "I like baseball better than basketball because baseball is played outdoors"; "On this day we had more fun than I have ever had since"; "I like reading better than any other subject we have in school."

Results of this analysis proved interesting, although of doubtful value because of the small number of actual comparisons found.

Such differences as were found between deaf and normal subjects are indicated in Table 75.

TABLE 75

NUMBER OF STATEMENTS OF COMPARISON FOUND IN WRITTEN COMPOSITION OF NORMAL AND DEAF SUBJECTS IN GRADES III, IV, V, AND VI

Sex	Grade							
	III		IV		V		VI	
	Normal	Deaf	Normal	Deaf	Normal	Deaf	Normal	Deaf
Boys.....	25	2	34	24	34	8	19	16
Girls.....	15	12	38	27	8	7	25	11
Total.....	40	14	72	51	42	15	44	27

The results shown in Table 75 are based on an analysis of four themes for each of forty normal subjects at each grade level and on four themes for each of 257 deaf subjects distributed among the four grades. Thus we can see that the number of actual comparisons used in the written expression of both groups at these grade levels is almost negligible. One would be safe only in assuming one thing, namely, that the normal use from 40 per cent to nearly 200 per cent more statements of comparison than do the deaf. While the numbers involved are too small to have much significance, the results are in accord with those obtained from the completion test shown in Table 73. Of the connecting words, such as conjunctions, which were used in the written discourse, apparently a very small part are indications of comparisons.

Relational Word Errors and Time Errors Among Deaf and Normal Subjects

As stated earlier, one of the methods used to check on the relational word count as a measure of understanding was to count the errors found in the use of such words. This, like the statements of comparison, proves somewhat disappointing from the standpoint of the numbers involved. It does, however, substantiate certain assumptions made in chapter vi[1] with reference to the cause of the normal subjects' superiority over the deaf on the completion test.

Along with the errors in use of relational words, a record was kept also of errors of time. This was done because of the writer's observation of the difficulty encountered by the deaf in acquiring or expressing a correct sense of time. It was assumed, therefore, that the errors made in the concept of time might shed additional light on the comparison made between normal and deaf on the time division of the completion test.

The three types of errors recorded in the study are presented in Table 76.

TABLE 76

ERRORS IN USE OF PREPOSITIONS AND CONJUNCTIONS AND ERRORS OF TIME FOUND IN WRITTEN DISCOURSE OF NORMAL AND DEAF SUBJECTS IN GRADES III, IV, V, AND VI

Errors and Sex of Subject	Grade							
	III		IV		V		VI	
	Normal	Deaf	Normal	Deaf	Normal	Deaf	Normal	Deaf
Time								
Boys.....	8	72	3	59	2	57	4	74
Girls.....	13	16	...	37	...	55	1	28
Total....	21	88	3	96	2	112	5	102
Conjunction								
Boys.....	6	26	4	20	...	30	2	40
Girls.....	9	14	2	19	...	12	...	21
Preposition								
Boys.....	6	53	4	70	1	62	2	52
Girls.....	1	19	2	26	1	37	1	18
Total....	22	112	12	135	2	141	5	131

[1]Cf. page 88.

Obviously there is no justification for grouping together the three types of data included in Table 75 other than that all represent errors. For this reason the total of time errors is recorded separately from the total of relational word errors.

Data here are too meager to justify any safe conclusions. As stated before, they may strengthen some previously made conclusions. With reference to time errors, the evidence appears conclusive that the deaf are much inferior at each grade level. Incidentally, it will be observed from the detailed form of analysis shown in chapter iii[1] that a record was made of the abstract nouns referring to Time. A larger percentage of these were found in the writing of the normal than in that of the deaf subjects. So it appears the deaf not only make more errors of time in the use of their verbs particularly, but they make fewer references in their thinking to ideas involving time. In checking the errors of time, the simple errors of verb form which indicate tense were not used as the criterion for classifying as an error. Rather, the obvious intent of the statement and the relation of the ideas involved were used as the determining factors. For example, a third-grade deaf girl, writing of why she likes winter rather than summer, says, "In summer we did not had a good time." Another says, "Some of the pennies are very old when the war stopped." A better example reads, "We will go after the geese yesterday." All these indicate either an actual confusion of ideas relating to time or a confusion in means of expressing time. Whichever it is, the deaf are decidedly retarded as compared with the normal.

A second observation with reference to the time factor of Table 76 is that the deaf show no real consistent improvement in the time sense from Grade III to VI, whereas the normal have practically eliminated all errors of time.

Errors of Conjunctions and Prepositions

These two may be grouped together because the conditions of growth seem to be similar in both. Here again, the only obvious conclusion that the data probably justifies is that the normal are far in advance of the deaf at every level. Aside from this, the most interesting point is that the deaf actually become less efficient with each successive grade. In other words, the increasing

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[1] Cf. page 23.

percentage of conjunctions and prepositions used by them at the upper levels is accompanied by an increase in the number of errors of usage. The normal subjects, as in the time errors, have reduced the errors to a negligible amount at the upper levels. It is interesting to note that there are practically no errors in the use of conjunctions and prepositions even at the third grade by the normal subjects.

Again, in enumerating errors in use of conjunctions and prepositions, the obvious intent of the statement was used as the criterion rather than any technical errors of grammar. For example, a common error in preposition usage is to insert a "to" where not needed, as, for example, "I can go to swimming in summer," or "We spent three days to fishing." A second common error is a confusion of prepositions, as, "He succeeded to taking off the string."

Conjunction errors are of many types. Typical are the following: "In summer there is a large round moon and it shines at night that we can see everywhere." "Mary does not know if to go or not." "I like summer better than winter because the summer was very hot than winter." "I like winter better summer and it has snow."

Interestingly enough, many of the conjunction errors are those involved in the subject's attempt to make a comparison of ideas. Thus the error enumeration tends to substantiate the evidence discussed earlier with reference to the difficulty encountered by both deaf and normal with reference to comparisons on the completion test.[1]

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[1] Cf. page 86.

CHAPTER VIII

CONCLUSIONS AND IMPLICATIONS

The main body of the present study is included in the preceding four chapters. Throughout these chapters and at the conclusion of each, brief summaries of the most significant facts have been given. It will be the task of the present chapter to recapitulate some of these facts and interpret all of them in the light of the entire collection of data. Out of this, certain implications for education can be drawn.

Language Development as a Measure of Differences

The present study was attempted as a descriptive analysis of deaf and normal subjects with reference particularly to one general phase of language growth. The phase chosen was that which we have chosen to call "abstract" language. Specifically, the term "abstract" includes the substantive terms and the connecting or relational words.

There were two objectives in view in emphasizing this particular aspect of language growth. The first objective was to secure data which would enable one to describe the growth of the normal and deaf children in terms of the quality of their expression, and to compare the growth of the two groups in this respect. The second objective was to secure data which might enable one to make certain deductions with reference to the relationship of abstract language development to the quality of intelligence. The first of these objectives is concerned really with a study of differences among individuals; with differences among individuals who are normal in that they possess all their senses and exhibit normal achievement in school; and differences among individuals who are without the use of the sense of hearing.

The second objective was not set up without a realization of the dangers involved in making such deductions, nor with too much faith in the finality of such deductions as may seem to be

justified from the evidence presented. The writer is fully aware that one of the weaknesses of such a study is to be found in the tendency to make deductions and draw implications which are only vaguely suggested from the data. While the second objective here is the more tempting from this point of view, it is likewise the one most difficult of attainment.

In so far as possible the conclusions and implications of this study will be related to these two objectives.

Growth in Terms of Quality of Expression

To attempt a distinction between quality and quantity of expression may not seem at first thought to be pertinent to the problem at hand. Nevertheless it is one of the assumptions underlying this study. Vocabulary studies have nearly always been concerned with quantity of expression. The number of words used by average children at each age has been determined by a variety of methods. Studies and classifications have been made of the first words of infants, and of their growth up to different levels of childhood. Size of vocabulary is generally assumed to be a measure of intelligence. This is reflected in the importance attached to vocabulary as part of intelligence tests. Terman and Merrill consider the vocabulary test to be the most valuable single test in their entire scale.[1] In a sense such a standardized scale takes quality into account in that the words have been scaled according to difficulty, and difficulty may be thought of as partially dependent upon the quality of words involved. In such scaled tests it is interesting to note that the criterion of difficulty is largely the quality of abstractness. The easiest words are concrete; the most difficult are abstract. To infer, therefore, that the mere size of vocabulary which a child uses is a measure of intelligence, without attaching any weight to the quality of the words used or their difficulty, which is a measure of quality, seems to the writer to be a careless inference. Since abstract words are least frequently used by children and the last to be acquired, it appears logical to consider their usage as a criterion of quality as apart from mere quantity of expression.

The first deduction to be made, therefore, is that all differences in expression which have been discussed in the present

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[1] Lewis M. Terman and Maude A. Merrill, Measuring Intelligence, p. 302. Boston: Houghton Mifflin Co., 1937.

study in terms of mathematical quantity should be thought of as differences in quality as well.

Qualitative Differences Among Normal Subjects

Usage of abstract nouns.--At the third-grade level, the normal child's total language expression consists largely of verbs, adjectives, personal pronouns, and concrete nouns, that is, those words having definite points of reference in the physical world. The evidence shows there is a change in the relative proportion of these with age. There is a general tendency for the concrete nouns to decrease from grade to grade at a rather constant rate which coincides with the increase in proportion of other words, notably those of a more abstract nature. Unless complexity of thought decreases with age and school experience, then it must follow that abstract words are an accompaniment of increased thought complexity.

Within the group of words classified as abstract in this study, there are gradations of difficulty or quality. Among the normal subjects this is shown roughly by the differences in proportion of the various types of abstract words which supplant the concrete words at each advancing grade level. For example at Grade III the normal boys' total written expression includes 4.5 per cent of abstract sensory nouns. Those are the words of a generalized nature, with no definite point of physical reference, but expressing a quality or act the origin of whose meaning is dependent upon some rather objective sensory content, such as "roundness" or "redness." At the fourth grade this percentage has increased to 5.1; at the fifth to 5.4; and at the sixth to 6 per cent. For the girls there is a similar increase with a slightly larger proportion at every level.

At the beginning of the study it was decided to attempt to differentiate between abstract nouns such as those just enumerated, with an origin in sensory experiences, and abstract nouns which have no sensory content, or rather, a minimum of such content. Words such as "enjoyment" and "fairness" were placed in this category. In this division we observe that at the third grade the normal boys employ a total of 3.8 per cent of non-sensory nouns. At the fourth grade the amount has changed to 4.8; at the fifth to 5.6; and at the sixth it is 6.2 per cent, or approximately

70 per cent more than were used at the third-grade level. For the girls the development is similar.

As mental life matures then from the third grade through the sixth it evidently utilizes more generalized forms of thinking. In so far as these forms of thinking are represented by substantives, the individual makes larger use of those abstractions whose meanings are derived from sensory data, especially at the lower grade levels, but by the time the sixth grade is reached both boys and girls use practically as many non-sensory words as they do sensory words. The point of interest is that both develop rapidly from Grade III, and are still developing at Grade VI.

Emphasis is added to this point concerning the growth from grade to grade by the fact that even though the proportion of abstract nouns varies, depending upon whether the child is using description, narration, or exposition, the constant growth fact is present in every case.

Usage of relational words.--Words rarely appear in isolation, but nearly always in combination. This is especially true with the language of any except the infant. Thus much language must of necessity refer not to things, actions, feeling, or qualities; nor to the expression of action; nor to the description of things or actions. It must refer instead to the connection, organization, and relationship of ideas. Such words are verbal abstractions. An explanation of such a word always involves a verbal expansion which results in a reduction to other words which refer to things or to actions having more concrete reality and with which we have had experience.

The evidence of the present study can be interpreted to mean that in this field of relational words in language there are also degrees of difficulty or quality. This fact is shown, as in the case of abstract nouns, by the difference in the ages at which certain forms of relational words appear and by their frequency at those ages.

Prepositions and coordinating conjunctions are present in the largest proportion of any of the relational words at the third-grade level. Of these, the prepositions appear in largest numbers. Thus the expression of direction of action, which is the function of most prepositions, becomes a necessity rather early in the individual's language development. The percentage of such words increases from 7 per cent at Grade III to 9.7 per cent at Grade VI

for the normal boys, with a consistent increase between successive grades in the total amount of words on each of the four samples of expression.

Next to prepositions in the group of relational words come the coordinating conjunctions. Evidence of this study shows that these are not as essential to the child's expression, even at the sixth-grade level, as are the prepositions. The fact that they do increase in number from 5.1 and 4.3 at Grade III to 5.5 and 4.7 at Grade VI for the boys and girls respectively, indicates a relatively small growth, which leads to the conclusion that the approximate number of coordinating conjunctions needed for mature speech is acquired early in life. Because of the very limited number of words classified as coordinating conjunctions, this means that the simple tying together of words and of complete and independent ideas is a less complex and more frequently used process, at the early ages, than are the methods of relationship shown by two other forms of relational words--the subordinating conjunctions and relative pronouns. In fact, the study gives evidence that there is actually a decrease in the importance of coordinating conjunctions after possibly the fourth or fifth grade. As more complex modes of thought arise this type of conjunction apparently gives way to other types which are more discriminating in the kind of relationship expressed.

Discrimination a characteristic of complex relational thinking.--The relational words which appear to be nearest complete development in the child's early language attempts are the coordinating conjunctions and prepositions. These are primarily means of expressing either direction of motion or the simple union of words or ideas in a compound fashion. Neither type of word takes into account any subordination or inequality of ideas, one to the other, nor do they require an extension of thought to the point where a single word is made to stand in the place of an idea and refer to it, as is often done with the relative pronouns.

For these reasons the subordinating conjunctions and relative pronouns appear to be the most discriminative and complex of all forms of relational words. Whether one shall say, "It was dark, yet we could not find the way," or, "It was dark, so we could not find the way," involves considerable mental shifting of the possible relationships involved. So it is with cause, effect, time, comparison, condition, and the various other relationships

which are involved whenever one goes beyond the sentence with one single idea.

Subordinating conjunctions are of minor importance as judged by the quantity used at the third-grade level. They increase more than 50 per cent during the three years following, but are then relatively few in number. The percentages of 2.1 and 2.2 at the third grade increase to 3.6 and 3.7 at the sixth for boys and girls respectively. The constant rate of growth throughout the four years indicates that the average sixth-grade child has not nearly reached his maturity in this phase of language.

The increase in maturity of thinking from Grade III to VI demands a greater increase in proportion of subordinate conjunctions than in either prepositions or coordinate conjunctions.

Relative pronouns make an even greater proportionate increase. They have barely appeared in the expression of the third-grade child. They have doubled in quantity at the sixth grade, the increase being from .4 and .3 at Grade III to .9 and 1 per cent at VI for boys and girls respectively. Relative pronouns do not occupy a large place, however, in the discriminative expression of mature minds. That they make such a large and consistent growth during the period studied here indicates that they are an index of general maturity of thought as reflected in language expression.

Sex Differences

Normal subjects.--The present study leads to but two general conclusions relative to sex differences among normal subjects. The first may be summarized by saying that no significant sex differences are found at the levels studied here, but such differences as do exist favor the girls in the usage of abstract nouns and the boys in usage of relational words, up to the sixth grade at least. The second conclusion is that there is evidence of a difference in the age of development of these two types of language expression. The boys make a more rapid growth at the early grade levels with an indication of earlier cessation, while the girls make a more steady growth with nearly the same increment at the upper as the lower grade levels.

Deaf subjects.--For the deaf, the sex differences in abstract nouns favor the girls at all levels save the sixth, where the boys surpass them. The differences at the first three levels are fairly large though not completely reliable.

In relational words, the boys excel the girls at all grades except the fourth, where for some reason they show a marked decline. Thus there is a general correspondence of sex differences among deaf and normal subjects.

Differences between Normal and Deaf Subjects

In terms of quantity of abstract words.--The normal boys and girls are clearly superior to the deaf at every grade level in the percentage of abstract nouns used. The differences at each grade except at the third are statistically reliable.

In the relational words, normal boys excel at every grade level and in amounts that are completely reliable at all except the third grade. Normal girls also excel deaf girls at every level but not in amounts completely reliable until the fifth grade is reached. Thereafter the differences increase rapidly.

This common factor, an increasingly larger difference after the third grade, indicates a more rapid development on the part of normal children.

In terms of school grade.--Normal and deaf subjects used in the present study were equated on the basis of years of school experience, thereby making that factor equal, from the standpoint of time, in the language development of both groups.

Evidence of this study enables one to make four conclusions relative to the amount of difference in terms of school grade, between normal and deaf:

1. In use of abstract nouns of all types, sixth-grade deaf boys are only slightly superior to fourth-grade normal boys--a retardation of two grades.
2. Sixth-grade deaf girls are closest to the status of third-grade normal girls in the use of abstract nouns--a retardation of nearly three grades.
3. In relational words, deaf boys at Grade VI are only slightly superior to normal boys at Grade IV--a retardation of nearly two grades.
4. Deaf girls are inconsistent in their growth in relational words, but at Grade VI their status is only midway between that of the normal fourth and fifth--a retardation of approximately one and one-half grades.

In terms of chronological age.--In terms of age in years, the grade differences may be interpreted as follows:

1. In use of abstract nouns, deaf boys are retarded approximately four years.
2. Deaf girls are retarded approximately fifty-eight months, or nearly five years, in use of abstract nouns.
3. In use of relational words, deaf boys are retarded as in abstract nouns, about four years.
4. Deaf girls are retarded in relational words approximately forty-two months, or three and one-half years.

In terms of intelligence.--It will be recalled that the normal subjects used in the study were equated on the basis of intelligence also. Hence sex and grade differences in language are not explainable on that basis. The deaf showed no consistent or reliable sex differences in intelligence and no grade differences. The only significant language differences found within either group are grade differences and not sex differences. Within either group, then, chronological age and school experience are apparently the general factors at work to produce differences from grade to grade. This leads directly to a discussion of our second objective mentioned early in this summary, namely, the consideration of a relationship between abstract language and intelligence.

Abstract Language and Intelligence

Probably the most meaningful finding of the entire study is the very obvious retardation of the deaf subjects in the development of abstract language. This has been summarized in the foregoing chronological age and grade differences. Without much doubt the study establishes proof of a reliable difference. Such retardation is not explainable on the basis of school training, in which the two groups are equal. Neither can it be attributed to chronological age, wherein the deaf are greatly in advance of the normal. Within either group the increments of language growth may be due in part to both these factors, inasmuch as there are consistent gains from grade to grade for each group. But between the two groups the cause for differences must be sought in some other factor. From the evidence at hand we are not prepared to say that this factor is intelligence. In fact, this study makes no pretense of asserting which group is the more intelligent as measured by either non-language or language test, or performance

tests. In the sample used here, including three representative schools for the deaf and a typical group of normal subjects, the deaf are decidedly inferior, as measured by a non-language examination. In general this evidence coincides with that found by investigators who have made a more thorough study of the problem.[1] Whether this relationship between language deficiency and intelligence in the deaf is a cause and effect relationship, and if so whether language deficiency is cause or effect, is outside the province of the present study to determine. Pintner is inclined to the view that low intelligence and deafness are both products of a third factor, and with that view we are ready to agree, since this study produces no evidence on the point.[2]

The specific point to which we wish to draw attention is that the deaf and normal exhibit specific language differences of a discriminative nature which heretofore have not been sufficiently investigated. These differences are not in the more concrete phases of language development. The deaf and normal subjects in this study show no striking differences in these more concrete phases (p. 91).

The differences develop and increase as the more abstract forms are analyzed. For example, there is a wider gap in the use of abstract non-sensory nouns than in the abstract sensory. Likewise, there is more of a discrepancy between the two groups in the use of relative pronouns than in prepositions. The non-sensory, among the nouns, are more abstract than the sensory, and the relative pronouns, among relational words, are more abstract than prepositions. This conclusion is based partly on a priori reasoning that some nouns require more of a generalizing process and some relational words more comprehension of subordinating conditions in order to understand. However, it is supported by the actual facts that show a larger increase from Grade III to VI in these so-called more abstract words than in the less abstract ones; and a larger increase in the five forms of abstract words

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[1]R. Pintner and D. G. Paterson, "A Measurement of the Language Ability of Deaf Children," Psychoanalytic Review, XXIII (1916), 413-36; J. C. Reamer, "Mental and Educational Measurements of the Deaf," Psychological Monographs, Vol. XXIX, No. 132, 1921; Keith MacKane, A Comparison of the Intelligence of Deaf and Hearing Children. Teachers College, Columbia University, Contributions to Education, No. 585, 1933.

[2]Rudolf Pintner, Intelligence Testing, pp. 194-217. New York: Henry Holt and Co., 1923.

analyzed in this study than in the more concrete words which were tabulated but not emphasized in the study. This growth must accompany an increase in complexity of mental life or an approach to mental maturity. If these increments in growth of abstract words are the accompaniments of mental maturity, then within a group of individuals with similar experiences it would seem that the quality of their language, as shown by the proportion of abstract words, rather than by the mere quantity of different words, would be a reflection of their relative mental maturity.

The first general inference, then, to which our data lead is that there is a practicable distinction between the deaf and the normal, and that this distinction is to be found, not just in language deficiency but in the abstract forms of language in the deaf child.

Language has long been regarded as a medium through which we may investigate the mental make-up of the hearing child. Our deduction from the evidence presented here is that all language is not equally valuable or discriminating as an index of intelligence.

Auditory experience as a factor in language development.--Attention has been called in this and the preceding chapters to various differences in the language development of deaf and hearing pupils. The chief task of the entire study has been that of describing these differences. Mention has just been made of the possible relationship between abstract language development and intelligence. Thus far the relationship of language development to hearing has been implied but not specifically stated.

The preceding evidence might be interpreted to mean that deafness is the cause of the language defects. Let us examine the problem in the light of the present evidence. Ample data have been presented to indicate that the deaf are inferior to the hearing in certain forms of language development. To say that they are "inferior," however, means only that the deaf use a smaller quantity of some language forms which are set up somewhat arbitrarily as indicative of a better quality of intelligence and thinking. These forms are the abstract nouns and relational words. That the deaf are not inferior in quantity of concrete nouns, verbs, and pronouns is also shown in the data presented. In other words, certain differentiating factors in the language of the deaf and hearing have been ascertained. To conclude that these factors are

present as a result of the lack of auditory experiences is not justified by the evidence presented in this study. There are, however, certain theoretical considerations to support such a conclusion. First of all is the well known fact that nouns which are classified as "concrete" in the present study, and such words as express simple action for example are the first to be taught to children for the obvious reason that such words can be illustrated. Such nouns have a definite reference to some object of the environment with which they can be associated. Abstract nouns have no such reference points. The meaning of such nouns must be arrived at either through specific teaching or through incidental learning. In either instance the auditory avenue is the one chiefly used. The same holds true for even the simplest relational words. The genuine difference in these two phases of language in the deaf and hearing is a reasonably valid proof of this fact, although there are differences in intelligence in the two groups. To observe a teacher of the deaf attempting to teach a twelve-year-old child the meaning of "which" in the sentence, "This is the pencil which I bought," or the meaning of "into" in the statement, "The Mississippi River flows into the Gulf of Mexico," impresses one with the futility of resorting to the visual sense in such instances. Probably few hearing children acquire the meaning of "into" in any except an incidental manner through hearing it used.

Such a conclusion is admittedly speculative, however. A more valid line of reasoning is suggested in the evidence given in a study by Keys and Boulware that the amount of residual hearing is an important index to the rate of growth in learning ability in hard-of-hearing children.[1] If learning ability depends upon amount of hearing, then language must depend upon the same factor. Again, however, we may be confused by the problem of intelligence which could be the third factor upon which both learning ability and language acquisition depend.

Again, if language development is a process of learning, there is reason to believe that such learning is dependent in part upon speech. The child's associations with words are fixed when he finds by trial and error that his attempts at verbalizing

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[1]N. Keys and L. Boulware, "Language Acquisition by Deaf Children as Related to Hearing Loss and Age of Onset," Journal of Educational Psychology, XXIX (1938), 401-12.

produce effects in his environment. The deaf child does not have the advantage of observing such effects because he has either no means of verbalizing or at best a very imperfect one. Thus his process of acquiring words is slowed perceptibly.

In the writer's opinion, one specific type of evidence is needed in order to establish the relationship between the auditory sense and language development. A comparison should be made of the language growth in two groups of subjects of similar chronological age and school grade, but differing in general intelligence. Similar comparisons should be made with age and school grade the variable. Thus the relative importance of these factors could be determined. If intelligence were not found to be the chief contributing factor, then we would be in a position to say that the deaf child, despite his lower intelligence, and regardless of the cause of the lower intelligence, should, with equal school training and other social factors, and with equal age, measure favorably with the hearing child in language development. His deficiency, if any, could then be attributed to auditory defect. Meanwhile, any conclusions must rest largely upon the theoretical considerations previously mentioned.

Implications for Education

For education, three specific implications arise from the foregoing inference. First, mental testing or educational testing, in so far as it involves language, may well take cognizance of the more purely abstract language forms as indices of ability to do complex thinking. Second, in the teaching of language either to normal or deaf children, a more complete recognition should be given to the difficulty of the different forms of abstract words. This suggests a more definite attempt to systematize both the order and the methods of presenting abstract nouns, with the sensory type first, and relational words, with prepositions and coordinate conjunctions preceding the subordinate conjunctions and relative pronouns.

Despite the fact that our evidence showed that those who use the most abstract words correctly are the ones who, in a recognition test situation, show that they have the most complete understanding of such words, we must caution ourselves against the assumption that merely to cause the child to acquire abstract words will thereby increase his level of intelligence. There is

reasonable certainty that highly complex thinking does not occur without the possession of adequate word symbols, but it by no means follows that the possession of the symbols insures the thinking processes.

A third and final implication for education lies in the very intangible benefit which occurs to teaching from a more complete knowledge of deaf and hearing children. Perhaps the chief merit of the present study lies in the descriptive analysis it makes of the specific language differences found to exist between the hearing and the deaf. The final conclusion remains that certain language forms are qualitative in nature, that is, they discriminate between normal and deaf and between mature and immature better than other language forms; that these differences increase with mental maturity; and that the deaf child is inferior to the normal in these qualitative forms at all levels included within the present study.

A P P E N D I X

DIRECTIONS FOR WRITTEN EXPRESSION

For the four written samples of expression, the following subjects will be used, together with the accompanying directions which each teacher will follow.

I. My Most Exciting Experience

II. This Old Penny

III. Why I Like Summer Better Than Winter

IV. How To Play My Favorite Game

General Directions

The chief objective here is to get the pupil to express himself as freely as possible on each of these subjects. He will write on two of these each week. To encourage free expression the teacher should explain that the papers are not to be graded on the basis of correct English but rather on how interestingly and clearly the story is told. It is further suggested that the pupil be given not only the regular writing period but any free time he may have during the day to make the story complete. He should not be hurried.

Teachers may motivate the work in their usual manner, and see that pupils follow their usual custom with regard to use of pen and ink, observance of margin, and other general rules they may have been taught. The impression should be given that this is a part of their regular work. With older pupils this is important, as they will sometimes resent doing a thing for an outsider. If the teacher has been accustomed to emphasizing correct form in written work, however, this emphasis must be shifted and

the idea made clear to the pupil that what is wanted is a clear, free, and rather lengthy discussion written in the pupil's own way.

Specific Directions

Theme I-----My Most Exciting Experience

For younger pupils, the teacher will need to explain this title and put it within their understanding. Explain that it may concern anything they have either experienced or seen; it may be only a short experience such as an accident, or a longer one like a trip or an all-day picnic.

Theme II----This Old Penny

Pennies will be furnished to the teacher, so each child may be given a penny and told that he is to keep it. Urge him to write all he can about the penny. Do Not Suggest that he may either describe it or write an imaginary history of it since one of the objects of this study is to see which pupils are of the imaginary type. If they ask if an imaginary story is permissible, then of course the answer must be yes.

Theme III---Why I Like Summer Better Than Winter

This is suggested as a subject in order to develop an argumentative discussion. Therefore the suggestion should be made that the pupil may write on either side of the question he prefers.

Theme IV----How To Play My Favorite Game

This may concern a game they like to play or a game they like to watch. It may be an athletic game or parlor game or any form of amusement either indoor or outdoor. The two ideas to be included in this composition are exposition and description. That is, an explanation of how the game is played and some description of the game itself. The first of these is the more important, and the teacher should stress the fact that the game must be explained thoroughly.

RELATIONAL WORDS APPEARING
IN COMPLETION TEST

after
although
as
as--as
as if
both--and
before
because
but
but--also
either--or
for
if
more--than
not only--but also
since
so
so--that
that
unless
until
what
when
where
whether
which
while
who
whose
why
yet

COMPLETION TEST

DIRECTIONS: Place in each blank the one word which makes the sentence have meaning. Use only ONE word in each blank.

1. We go to bed _____ studying our lessons.
2. _____ the man was old and lame, he walked to church every Sunday.
3. I shall do _____ you say.
4. April is not _____ cold _____ January.
5. _____ Lincoln _____ and Washington were born in February.
6. _____ the sun rises, the world is in darkness.
7. We wear our caps in winter _____ we want to keep warm.
8. In winter the sun shines _____ it is not very warm.
9. In summer the days are _____, _____ long _____ _____ very warm.
10. In our country a man must _____ work _____ starve.
11. We like summer _____ then we can go swimming.
12. I will be late for school _____ I do not hurry.
13. There are _____ people in New York _____ in any other city in America.
14. We have not gone skating _____ last winter.
15. It has not rained for a month _____ the ground is dry.
16. John is _____ tall _____ his sister.
17. The ocean is _____ big _____ it takes several days to cross it.
18. We were glad to hear _____ our boys had won.
19. It was cold yesterday _____ we did not play outdoors.

20. You can not get a good mark _____ you study.

21. I do not know _____ you are talking about.

22. We will shoot firecrackers _____ the Fourth of July comes.

23. A man asked me _____ my home was.

24. Mary does not know _____ to go or not.

25. It is not easy to decide _____ of the two books is the better.

26. _____ I was eating dinner, I listened to the radio.

27. We could not tell _____ was at the door.

28. On Mother's Day, each person _____ mother is alive wears a red flower.

29. The boy does not know _____ he was kept after school.

30. I did it, _____ I know not why.

31. The dog barked _____ _____ he did not know his master.

32. The dog stayed beside the door and waited _____ his master came.

33. The air gets warmer _____ the sun rises.

34. _____ he is quite tall, his brother is taller.

35. We looked at the flowers _____ we drove along the road.

36. Some boys like winter _____ well _____ summer.

37. _____ summer _____ winter are warm in the South.

38. People must have money _____ they can build houses.

39. Cotton grows better in the South _____ it is warmer there.

40. Bob wanted to buy some candy _____ he had no money.

41. The winters in Alaska are _____ _____ cold _____ _____ long.

42. The teacher said we must _____ study _____ fail.

43. The teacher thanked the boy _____ picking up the papers.

44. Our house would have burned _____ the firemen had not come quickly.

45. Henry Ford has _____ money _____ most people have.

46. _____ the last war, we have not built many ships.

47. The little girl was tired _____ she was ready to go to bed.

48. Girls can not run _____ fast _____ boys.

49. It is _____ far to the stars _____ we can hardly see some of them.

50. The children did not know _____ you were coming to visit them.

51. In the North it is cool in summer, _____ many people go north then.

52. Men do not work well _____ they are paid for it.

53. I did not hear _____ you said.

54. _____ winter comes, the river freezes.

55. The child was lost and did not know _____ his mother was.

56. Every boy must go to school _____ he wants to or not.

57. John does not know _____ of his teachers he likes best.

58. _____ the white men slept the Indians stole their horses.

59. No one could tell _____ was coming in at the door.

60. The tree _____ leaf is prettiest is the oak.

61. No one knows _____ winters are so much colder than others.

62. The man is old _____ active.

63. The player walked _____ _____ he had been hurt.

64. _____ snow _____ ice are found in very warm countries.

65. Sometimes the ice stays on the lake _____ the first of May.

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